VOL. VII OCTOBER 1956 NO. 10

UNITED STATES ARMED FORCES MEDICAL JOURNAL

Published Monthly by
the Armed Forces Medical Publication Agency
Department of Defense

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UNITED STATES
GOVERNMENT PRINTING OFFICE
WASHINGTON : 1956

THE PRINTING OF THIS PUBLICATION HAS BEEN APPROVED BY
THE DIRECTOR OF THE BUREAU OF THE BUDGET, 20 FEB. 1956

Monthly Message

The paragraph printed below is the first part of one of the paragraphs in President Jefferson's First Inaugural Address, in which he advises that we keep clear of entangling alliances. As you will recall, his first administration was really the great period of his presidency, for it was during these years that the Louisiana Purchase was made and the Lewis and Clark Expedition organized and carried through to a highly successful conclusion.

> About to enter, fellow-citizens, on the exercise of duties which comprehend everything dear and valuable to you, it is proper you should understand what I deem the essential principles of our Government, and consequently those which ought to shape its Administration. I will compress them within the narrowest compass they will bear, stating the general principle, but not all its limitations. Equal and exact justice to all men, of whatever state or persuasion, religious or political; peace, commerce, and honest friendship with all nations, entangling alliances with none; the support of the State governments in all their rights, as the most competent administrations for our domestic concerns and the surest bulwarks against antirepublican tendencies; the preservation of the General Government in its whole constitutional vigor, as the sheet anchor of our peace at home and safety abroad. . . .

Frank B. Berry

FRANK B. BERRY, M. D.
Assistant Secretary of Defense
(Health and Medical)

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Foreword

The *United States Armed Forces Medical Journal* is the medium for disseminating information of administrative and professional interest to all medical personnel of the Department of Defense. The Assistant Secretary of Defense (Health and Medical) and the Surgeons General of the several services invite all medical officers, dental officers, Medical Service Corps officers, Nurse Corps officers, and officers of the Veterinary Corps of the Armed Forces, and the medical consultants of the Army, Navy, and Air Force to submit manuscripts for publication in this *Journal*.

FRANK B. BERRY, M. D.,
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MAJOR GENERAL SILAS B. HAYS,
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UNITED STATES ARMED FORCES MEDICAL JOURNAL

Volume VII October 1956 Number 10

DIPHENHYDRAMINE THERAPY OF EPIDEMIC HEMORRHAGIC FEVER

In the Early Febrile Phase

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EPIDEMIC hemorrhagic fever (EHF) is characterized by physiologic and pathologic changes that appear to involve primarily the vascular system.[1-3] The flushed appearance of the skin and the conjunctival injection commonly observed in the first three days (early febrile phase of disease) and the hemorrhages, proteinuria, elevated hematocrit values, and peripheral vascular shock seen after the third day (late febrile and shock phases of disease), all suggest a generalized alteration in the capillary vessels.[4-6] Greisman,[7] in direct observation of the nailfold capillary bed, noted dilatation and loss of vasomotion during the late febrile phase in about 80 per cent of the patients. Because such physiologic changes resemble those induced by histaminelike substances, an earlier group of investigators[8] undertook the treatment of EHF patients with diphenhydramine (Benadryl Hydrochloride ®). Although these results were equivocal, it should be noted that treatment was initiated some days after onset of illness, when the patients had already developed a severe proteinuria.

From the Field Unit of the Commission on Hemorrhagic Fever of the Armed Forces Epidemiological Board, at the Hemorrhagic Fever Center and the 45th Evacuation Hospital, Korea; and from the Walter Reed Army Institute of Research, Washington 12, D. C. Dr. Stockard is now at the University of Maryland School of Medicine, Baltimore, Md.

The authors gratefully acknowledge the support of the Commission and the help of their colleagues in the Center, the Hospital, and the Institute, as well as the backing of the Office of the Surgeon, Eighth U. S. Army, and of the Surgeon, Armed Forces of the Far East. Special thanks are due to Dr. Joseph E. Smadel for his assistance in planning the study, and to Lt. Col. D. Crozier, MC, Lt. Col. E. Ricketts, MC, Lt. Col. D. White, MC, Capt. C. Southam, MC, Lt. Col. H. L. Ley, Jr., MC, Maj. L. P. Frick, MSC, and Lt. P. Moore, AMC, for aiding us in the study or in preparing this report.

Interest in a humoral factor capable of causing capillary damage revived when plasma from patients acutely ill with EHF was found to cause dilatation of terminal arterioles of the rabbit bulbar conjunctiva.[9] Furthermore, diphenhydramine again came into the picture when this drug was shown to block or reverse the vasodilatation induced in the rabbit's eye by patient's plasma.[9] The idea was entertained that diphenhydramine might arrest or impede the progress of EHF if administered before the vascular physiologic changes reached the point where severe plasma leakage occurred. The present study was undertaken to test this hypothesis in patients whose treatment was begun within 36 hours after onset of EHF.

METHODS

During earlier outbreaks of EHF, patients seldom had been admitted to the Hemorrhagic Fever Center (HFC) in Korea before the third day of their illness. Therefore, in this study, which covered the period from May to July 1954, one of us was stationed at a division clearing company in a sector that was a known EHF endemic area, to permit early examination of suspected cases and to institute therapy in selected patients within the shortest possible time after onset of illness. All patients reporting to this advanced installation with complaints of headache, backache, and malaise were chosen for special study if they also presented the following history and findings: exposure in a known EHF endemic area 1 to 6 weeks before the onset of symptoms; oral temperature of 100°F or higher; duration of illness of 36 hours or less; and absence of a positive malaria smear, tonsillar exudate, or roentgenologic evidence of pneumonia. All potential EHF patients whose symptoms were of short duration were thus included in the study, while patients whose illness might be attributable at this time to other causes were excluded.

Diphenhydramine has a sedative effect in addition to an antihistamine action, and since rest and sedation are considered important in the treatment of EHF,[4] it seemed necessary to administer a sedative drug to a control group of patients. Phenobarbital was chosen for this purpose. Sufficient diphenhydramine or phenobarbital to provide a full course of drug for one patient was packed in a bottle that bore no markings other than a code number.* Moreover, the phenobarbital was dispensed in capsules having the same appearance as those containing diphenhydramine. Selection of patients who were to receive one or the other drug was made arbitrarily: When the sum of the last 3 digits of the patient's army serial number was even, he received 200 mg of diphenhydramine orally every 6 hours for 4 doses, followed

*Benadryl and phenobarbital used in the study were supplied by Parke, Davis and Company.

by 100 mg every 4 hours for 24 doses, *i. e.*, 3.2 grams over a 5-day period. When the sum was odd, the patient received 20 mg of phenobarbital orally every 6 hours for 4 doses, followed by 10 mg every 4 hours for 24 doses, *i. e.*, 0.32 gram over a 5-day period. When medication was vomited within an hour, the same dose was readministered orally. The coded bottle containing the complete course of drug was marked with the patient's name; this stayed with him until used or until the man was dropped from the study. Only the investigator who selected the patients in the forward area and started them on therapy knew the code.

Patients initially diagnosed as probably having EHF were promptly evaucated to the HFC. Others were observed for a few days in a special ward at the division clearing company; if the diagnosis of EHF could not be excluded, these patients were also evacuated to the HFC. All patients were transported by helicopter in order to minimize trauma.[1] A copy of the recorded clinical and laboratory observations, medication schedule, and the remaining capsules of drug in the patient's own bottle accompanied each man. Daily examination and care at both installations included observation of clinical symptoms and signs, recording of fluid intake and output, and determination of leukocyte count, hematocrit by the copper sulfate method, and specific gravity of urine. Daily qualitative and quantitative urine protein determinations were made at division clearing and the HFC, respectively. Blood urea nitrogen values were determined daily at the HFC only. General care included diet as tolerated, and when indicated because of anorexia, vomiting, or oliguria, 5 or 10 per cent dextrose in distilled water administered intravenously. Demerol (brand of meperidine hydrochloride) was given when pain was severe. Patients were permitted to begin ambulation on the third day after proteinuria ceased or, in the absence of proteinuria, on the second afebrile day. No patient in this study received either aspirin or hormone therapy.

Criteria for the final diagnosis of "epidemic hemorrhagic-fever confirmed" were as follows: (1) exposure in a known endemic area within 1 to 6 weeks of the onset of symptoms; (2) oral temperature over 100°F persisting for 4 or more days; (3) proteinuria of 0.5 gram per liter on 2 or more consecutive days; (4) hyposthenuria, specific gravity less than 1.024, during the second week of illness by 12-hour Fishberg concentration test or serial 24-hour urine specimens; and (5) one or more of the following: petechiae, azotemia with blood urea nitrogen over 25 mg per 100 ml, oliguria with 24-hour urine output of less than 500 ml per day, diuresis with 24-hour urine output of at least 3,000 ml per day for 2 consecutive days, leukocytosis with white blood cell count exceeding 10,000 per μl, or hemoconcentration with hematocrit over 53 ml per 100 ml. Patients whose findings did not fulfill these criteria and who did not have a recognizable nosologic

entity were discharged after two or more days without fever, as "fever of undetermined origin" (FUO).

The treated and placebo groups of patients were compared with regard to the severity of illness when therapy began, incidence of confirmed EHF, severity and duration of symptoms and signs, and the duration and degree of abnormalities of the renal and hematopoietic systems as revealed by laboratory tests. In statistical analysis, the "t" test was used for evaluating differences between time after onset when therapy was begun, initial temperatures, and initial leukocyte counts. The presence or absence of albuminuria in the treated group was compared with the findings in the placebo group by the chi-square test with correction for small numbers. This test was also used to test for differences in incidence of confirmed EHF between the two groups. In interpreting the findings, differences were not considered significant unless the probability that they could have arisen by chance was 0.05 or less.

RESULTS

Evaluation of therapeutic procedures in EHF is complicated by the lack of specific procedures for establishing the diagnosis in a given patient. One is justified in making a diagnosis of confirmed EHF only in fatal cases which show pathognomonic lesions, or in patients who survive after displaying the classical clinical and laboratory findings of the disease. Thus, mild cases of EHF may remain unrecognized and receive a final diagnosis of fever of undetermined origin (FUO). Nevertheless, even under these circumstances an effective therapeutic regimen employed early in the course of disease might be recognized in a controlled study by a significantly low incidence of confirmed EHF in the treated as compared with the control group. Furthermore, partial effectiveness of such a regimen might be recognized if disease in the treated group were less severe than in the control group.

Of 93 patients who were included in the present study as EHF suspects, 47 received diphenhydramine and 46 the placebo (phenobarbital). The planned treatment schedule was completed in 68 per cent of the treated group and 70 per cent of the controls. Therapy was discontinued in all but 2 of the remaining patients because of early complete recovery; diphenhydramine was discontinued in those 2 patients because of possible drug toxicity. After eliminating from consideration patients whose temperature returned to normal within 4 days, as well as those with a diagnosable disease other than EHF, 34 patients (37 per cent) remained in the category of possible or confirmed EHF. Of these, 15 received the test drug and 19 the placebo. Careful analysis revealed that patients receiving the two regimens were comparable with respect to the pretreatment status of fever, leukocyte count, and proteinuria (table 1).

TABLE 1. *Pretreatment status of patients*

Diagnostic groups	Therapy	Number of patients	Therapy started hours after onset		Admission temperature		Admission WBC (× 1,000)		Proteinuria Number of patients			
			Mean	Range	Mean	Range	Mean	Range	0	T*	1+	2+	3+ & 4+
All patients	Diphenhydramine	47	20.9	5-36	102.1	100.0-104.8	9.0	4.2-22.0	35	4	7	1	0
	Phenobarbital	46	22.2	5-36	101.9	100.0-104.2	8.56	4.25-20.1	36	3	6	1	0
Patients with possible or confirmed EHF	Diphenhydramine	15	22.9	7-36	101.7	100.0-103.0	8.63	5.15-15.0	10	2	3	0	0
	Phenobarbital	19	24.1	7-36	102.1	100.0-104.2	8.25	4.4-13.6	13	2	4	0	0
Patients with confirmed EHF	Diphenhydramine	5	26.4	19-32	101.4	100.0-102.2	6.52	5.0-8.75	4	1	0	0	0
	Phenobarbital	6	23.9	18-31	102.4	100.0-103.8	7.14	5.0-11.2	4	0	2	0	0

*Trace

A final diagnosis of confirmed EHF was made on 11 patients. Five of these had been treated with diphenhydramine and 6 with phenobarbital. When very mild cases of confirmed EHF, *i. e.*, those with minimal proteinuria and blood urea nitrogen not exceeding 25 mg per 100 ml were excluded, there remained three cases in the treated and five in the control group. Statistical analysis demonstrated that rates of confirmation were not significantly different in the two treatment groups. Thus, it may be concluded that diphenhydramine did not affect the disease sufficiently to reduce the incidence of confirmed EHF.

No impressive differences were noted in the clinical course of the disease in the confirmed EHF cases treated by the two regimens. No fatalities occurred in either group, and the duration and severity of signs and symptoms were essentially the same in both. Petechiae were present for 16 patient-days in those given the test drug and for 18 patient-days in those who took the placebo. Subconjunctival bleeding occurred in one patient from each group and minimal epistaxis in one who received the antihistaminic. Slight fever persisted longer in some of the patients given the sedative, but the mean duration of fever was almost identical in the two groups. One patient in each group had mild hypotension which responded promptly when the foot of the bed was elevated.[1] Statistical analysis revealed no significant difference in the severity of hemoconcentration attained by patients in the two groups.

Although proteinuria was less severe in the test series, the difference was largely attributable to one patient in the placebo group, and statistical analysis indicated that the difference could readily be due to chance. Likewise, maximum levels of azotemia did not differ significantly (table 2). Therefore it may be concluded that even when administered early in the course of disease diphenhydramine did not influence the renal abnormalities that occur in EHF.

Data from all 93 patients in this study were analyzed for evidence of pharmacologic and toxic effects of diphenhydramine (table 3). Vomiting occurred with equal frequency and severity in the two groups, and was attributable to the disease rather than to the drugs. There was no appreciable difference in pain, as judged by the physician's clinical estimate of suffering or by the total dosage of Demerol administered by ward nurses. Duration of fever (over 99°F) was the same in both groups. Frequency of leukopenia (less than 5,000 white blood cells per μl) and neutropenia (below 50 per cent) was equal in both groups, but persistence for more than 4 days occurred only in 2 patients, both of whom received diphenhydramine. No bleeding tendency

was attributable to the drugs. In the test group, drowsiness was frequent, and disorientation with or without agitation was seen in 4 patients. These central nervous system changes disappeared on cessation of therapy.

TABLE 2. *Renal function studies in confirmed EHF patients*

Test	Diphenhydramine (5 patients)		Phenobarbital (6 patients)	
	Mean	Range	Mean	Range
Total grams protein excreted during illness	11.8	4.9-21.3	35.8	8.4-76.7
Maximum grams protein excreted per day	5.3	1.9-11.0	14.3	3.9-26.4
Day of disease maximum proteinuria	7.8	6-11	5.8	3-7
Latest day of proteinuria	10.8	7-14	12.0	8-17
Mean protein excretion per day during proteinuria phase	2.15	0.8-2.4	4.31	2.0-6.4
Duration of proteinuria (days)	6.8	3-9	7.5	4-12
Maximum blood urea nitrogen (mg/100 ml)	61.4	21-132	56.7	14-88
Patient-days of oliguria (less than 500 ml/24 hr)	6		1	
Patient-days of diuresis (over 3,000 ml/24 hr)	17		20	

DISCUSSION

The basic mechanism responsible for the alteration of vascular function in hemorrhagic fever remains unexplained. Recent investigations by Greisman and associates[10] revealed that the vasodilator factor found in the blood of patients during the first few days of EHF also appeared in the plasma of normal human beings after a 48-hour starvation period, and both produced the same vascular effect in an experimental animal. The starvation state may provide a likely explanation for the vasodilator effect of plasma from hemorrhagic fever patients. At any rate the reversal of the plasma-induced dilatation in the rabbit's eye by diphenhydramine was found dependent upon the vasoconstrictor rather than antihistaminic properties of the drug.[10] These animal experiments have neither eliminated local histamine release as the cause of vascular dysfunction in hemorrhagic fever nor ex-

TABLE 3. *Incidence of various findings in 47 patients treated with diphenhydramine and 46 patients treated with phenobarbital*

Findings	Therapy	
	Diphenhydramine	Phenobarbital
Vomiting		
Number of patients	7	5
Number of episodes	26	26
Total volume (liters)	2.5	3.2
Pain		
Patients receiving Demerol	10	9
Total Demerol administered (grams)	4.25	4.4
Subjective pain, average score	8.8	9.4
Fever		
Average number days over 99°F orally	4.7	4.9
Range of duration, days	1-14	2-13
Leukopenia		
Patients with less than 5,000 white blood cells	14	16
Patients with 3,000 to 3,500 white blood cells	2	2
Patients with leukopenia persisting more than 4 days	2	0
Patients with neutropenia less than 50 per cent	3	3
Bleeding tendency		
Patients with subconjunctival hemorrhage	2	2
Patients with mild epistaxis	3	1
Central nervous system changes		
Patients with drowsiness	12	4
Patients with disorientation	2	0
Patients with agitation	2	0

plained the mechanism by which the increased capillary permeability occurs. However, diphenhydramine even when given early in the course of EHF did not alter significantly the progression of the disease, thus suggesting that a factor other than histamine is involved in the important vascular changes which characterize this infection.

CONCLUSIONS

Certain clinical and experimental observations suggested that the abnormal vascular phenomena which characterize epidemic hemorrhagic fever might be controlled by antihistaminics if given early in the disease. A careful clinical investigation, in which 47 FHF suspects were treated with diphenhydramine within 36 hours after onset of illness and 46 similar patients received phenobarbital, failed to indicate any benefit from the antihista-

mine therapy. The severity of the disease in the test and placebo groups was comparable, and the proportion of suspected cases that were eventually confirmed as EHF was not significantly different in patients on the two regimens.

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WHERE'S THE APOSTROPHE?

"What happened to the apostrophe in the name, *St. Elizabeths,* has long been a mystery and will perhaps continue to be one. I did considerable research on how the name of our hospital became so ungrammatical, but the best I am able to report is that the apostrophe was lost sometime between the Civil War and the time the name was officially changed by the Congress 50 years later."

—WINFRED OVERHOLSER, M. D.
in *Hospitals,* p. 68, Aug. 1955

THE USE OF CORTISONE IN THE TREATMENT OF MUMPS ORCHITIS

EDWIN S. STENBERG, Jr., *Lieutenant Colonel, MC, USA*
WILBUR C. BERRY, *Colonel, MC, USA*

MUMPS is an acute communicable disease which has been recognized as a clinical entity for many centuries. Caused by a virus and known to be one of our most contagious of diseases, it classically involves the parotid glands, less frequently the submaxillary and other salivary glands. As complicating features, the virus may involve and cause inflammatory changes in the central nervous system, breast, pancreas, ovaries, and testes. Involvement of the last named, producing an epididymo-orchitis, is estimated to occur in from approximately 20 to 30 per cent of male patients who have the disease.

Because of the undesirable result of a varying amount of testicular atrophy in about 50 per cent of these cases, a thorough search has been made in the past for methods to prevent or ameliorate the acute inflammatory involvement of the testes. Many simple measures, such as bed rest, application of ice packs, scrotal support, and maintenance of adequate fluid intake, are generally considered to be of value. The use of estrogens, in particular diethylstilbestrol, for the prevention and treatment of mumps orchitis has been tried for many years, and, as there has been no convincing evidence that any striking benefit has resulted, their use has, in general, been discarded.

Cortisone acetate was given orally in a series of approximately 50 cases at this hospital in order to prevent orchitis, and the results were disappointing.[1] Although no well-studied series has appeared in the literature to date, many physicians have believed that the use of corticotropin and cortisone acetate in the treatment of mumps orchitis was of value. Friedewald[2] stated that, in his experience, these hormones have been effective in causing a rapid decrease in the pain and swelling of acute orchitis. Kinsell and Jahn[3] reported that intensive corticoid therapy appears to be consistently associated with rapid and complete disappearance of all inflammation in the gonads, and that if it is instituted early, probably no residual damage will result.

From Tripler Army Hospital, APO 438, San Francisco, Calif.

MATERIALS AND METHODS

In an effort to evaluate this prevailing opinion, a study was made at this hospital that included all patients with mumps accompanied by orchitis who were admitted here between 1 July 1955 and 10 January 1956. There were 21 such patients in this study. Their ages ranged from 14 to 56 years with an average age of 29.5 years. All patients with orchitis were treated with the accepted conventional measures, including absolute bed rest, analgesics as necessary, a Bellevue bridge for scrotal support, and ice bags as necessary. In addition to these measures, 14 of our 21 patients were given cortisone acetate orally, while the remaining 7 received only symptomatic therapy.

The first 4 patients in our treated series were given very short courses of cortisone acetate and, after an initial evaluation of their apparent lack of response, a more standard regimen was employed consisting of an initial dose of 300 mg the first day, 200 mg the second, and 150 mg the third and subsequent days. The drug was continued as long as seemed clinically necessary, and then the dosage was reduced in daily decrements of 25 mg. When the total daily dosage had been reduced to 25 mg, it was discontinued. The maximum amount used was 1.825 grams over an 11-day period.

No complications or untoward effects were noted in the treated group, although two patients (coincidentally, we felt) developed moderately severe herpes simplex of the face and labial areas during cortisone therapy.

RESULTS WITHOUT CORTISONE

In the untreated group, three of the seven patients had mild to moderate orchitis, and all three responded completely within three days to standard methods of therapy. Of the remaining four who had moderately severe to severe orchitis, two became asymptomatic and afebrile with return of the testes to normal size by the seventh day of the disease. The other two patients are discussed in the following case reports.

Case Reports

Case 1. A 24-year-old white man was admitted to this hospital on 18 August 1955 with a one-day history of salivary gland swelling and fever. On admission, he had tremendous bilateral parotid and submaxillary swelling and a temperature of 100°F. On the following day, an exudative pharyngitis was noted and a culture was taken which grew out beta hemolytic streptococci. On 19 August he was given 991 mg (1,200,000 units) of benzathine penicillin G intramuscularly. He became afebrile on the fourth hospital day and remained so until the seventh hospital day when he developed a temperature of 104°F without other clinical change. It was felt that a recrudescence of his pharyn-

gitis had occurred, and aqueous penicillin in the dose of 360 mg (600,000 units) every six hours was begun. On the following day, slight bilateral testicular swelling was noted and the patient's temperature rose to 104°F. The day after that his temperature rose only to 101°F, and penicillin was discontinued. The next morning he was afebrile and remained so thereafter. His testicular swelling increased gradually over the first three days and then subsided over the subsequent three days. At no time was tenderness noted. He was discharged to duty on 2 September without residual symptoms or positive physical findings.

Comment. It was felt that this patient most likely had developed moderate orchitis during the course of mumps, which was complicated by a beta hemolytic streptococcal pharyngitis which caused the high febrile response. In other ways, the orchitis responded well to symptomatic therapy and lasted six days.

Case 2. A 26-year-old white man was admitted to this hospital on 3 January 1956. On the morning of admission, the patient first noted right parotid swelling and tenderness and a very slightly swollen, but exquisitely tender, right testicle. His temperature on admission was 102°F where it remained for the first three hospital days, during which time no essential change was noted in the orchitis. On 6 January the patient began to have daily elevations of temperature to 104° and 105°F accompanied by severe headache and nuchal rigidity, and a diagnosis of mumps encephalitis was made. During this time the testicular involvement began to recede; on 10 January, however, the right testis became more swollen and the left one became minimally involved. By 13 January the temperature returned to normal, central nervous system symptoms and signs disappeared, and the orchitis was improving. By 17 January physical examination was normal, and the patient was without complaints. He was returned to duty on 20 January.

Comment. Although this patient's orchitis lasted for 14 days, it was secondary to his major problem of encephalitis and did not produce any significant symptoms.

RESULTS WITH CORTISONE

In the treated group, four patients received cortisone acetate therapy for only three days and were believed to have been inadequately treated. One of these patients had a mild case that responded completely in three days. One had moderately severe orchitis, was started on cortisone on the fourth day of the testicular swelling, and three days later was clinically well. The other two patients were improving on therapy but after its discontinuance on the third day developed fevers of 103° and 104°F, respectively. Both thereafter became clinically well after symptomatic therapy over a four-day period.

Of the remaining 10 patients, 4 showed excellent therapeutic responses, with immediate symptomatic relief and complete clearance of the orchitis in from 4 to 7 days. Four others showed

a moderately successful response as evidenced by symptomatic improvement without complete relief, and by a somewhat more protracted course with evidence of testicular inflammation for 7, 9, 12, and 12 days, respectively, while on cortisone acetate therapy. The remaining 2 patients showed an excellent response when adequate dosages were employed and are reported below.

Case Reports

Case 3. A 56-year-old white Army chaplain noted the onset of parotid gland swelling and tenderness on 1 September 1955. On 4 September he observed swelling of the right testicle and was admitted to this hospital on 5 September with increased testicular swelling and marked malaise. At that time his temperature was 99.6°F; there was moderate bilateral parotid and submaxillary swelling, and the right testicle was twice normal size and exquisitely tender. He was placed on cortisone acetate therapy, receiving 300 mg on 5 September and 200 mg on 6 September. His symptoms rapidly regressed and by the morning of 7 September he was asymptomatic and afebrile. The 0600- and 1200-hour doses were omitted. That afternoon his temperature rose to 102°F, and there was a marked increase in size and tenderness of the right testicle. By 1800 hours cortisone acetate was restarted in a dosage of 25 mg every 6 hours, and within the subsequent 24 hours the patient again became afebrile and asymptomatic. By 13 September the testicle had returned to normal size, and the dosage of cortisone acetate was tapered thereafter until on 16 September it was discontinued and the patient returned to duty.

Comment. This was believed to be our most dramatic case, since the patient initially had shown an excellent clinical response, only to have a marked relapse when cortisone acetate was omitted for 12 hours, and since reinstitution of therapy was again followed by a complete symptomatic and febrile remission.

Case 4. A 36-year-old white male Air Force major was admitted to this hospital on 27 August 1955 with a two-day history of parotid gland swelling and right testicular swelling of one day's duration. His temperature was 99.4°F on admission. Bilateral submaxillary gland swelling and tenderness were noted, and the right testicle was moderately enlarged and nontender. He was placed on cortisone acetate therapy, receiving 300 mg on 28 August, 200 mg on 29 August, and 100 mg on 30 and 31 August. His initial symptomatic response was excellent and, although his temperature had not risen above 100°F, he was completely afebrile by 30 August. On 31 August, however, his temperature rose to 102°F and on 1 September to 103°F with increased testicular pain and swelling. On 1 September, therefore, cortisone acetate was increased to 200 mg per day for the next three days, with an immediate and excellent symptomatic response. He became afebrile on 3 September and remained so thereafter. The right testicle gradually decreased in size, and was normal when the patient was discharged to duty on 8 September.

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Comment. This patient showed an excellent initial response to cortisone acetate, followed by an exacerbation of symptoms when the dosage was reduced below the optimum level and by a dramatic response when an increased amount of the drug was again given.

DISCUSSION

No definite conclusions can be reached from this relatively small series of patients. However, we have arrived at what we think is a reasonable approach to the treatment of mumps orchitis. It appears there is little to be gained from the routine use of cortisone acetate in treatment of the minimally involved testicle. Control patients and treated patients revealed no difference in their response to therapy, either subjectively or objectively, and all were clinically well within 3 to 4 days. It does seem justified, however, to treat patients who have moderately severe or severe orchitis with this hormone if certain factors are kept in mind. As in many other conditions where cortisone acetate is of benefit, the principal good derived is due to the antiphlogistic action of the hormone as the drug exerts no direct action on the causative organism. Therefore, adequate dosage is important and, in particular, a sufficiently prolonged course is necessary to cover the ordinary period of the inflammatory process in the testicle if a clinical relapse is to be avoided. There is no evidence to show that the natural course of orchitis is shortened by the use of cortisone acetate. With these limitations and factors in mind, moderate to excellent symptomatic relief for the patient is to be expected.

SUMMARY

A study to evaluate the efficacy of cortisone acetate in the treatment of mumps orchitis was made. Of 21 patients seen at this hospital between July 1955 and January 1956, 14 received cortisone acetate therapy in addition to the standard measures received by the control group, *i. e.*, bed rest, analgesics, scrotal support, and ice bags as necessary. Although no statistical evaluation was made, it was our clinical impression that patients with mild to moderate orchitis did well with either form of therapy. In those with moderately severe or severe mumps orchitis, an excellent symptomatic response resulted when adequate dosage of cortisone acetate was maintained for a sufficient period of time.

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SOMNAMBULISM

Electroencephalographic Studies and Related Findings

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BECAUSE of the observation that 26.6 per cent of 60 enuretic naval recruits were sleepwalkers and that 25 per cent of these 60 men had abnormal brain waves,[1] it was decided to obtain electroencephalograms and relevant genito-urinary, sleepwalking, and enuretic histories on a group of naval recruits who presented a primary problem of somnambulism. The observations suggest that in many cases of sleepwalking, bed-wetting, and epilepsy, the pathophysiologic process may be similar. Theoretically, an emotional stimulus is capable of activating a genetically determined central nervous system aberrancy, which results in the episodic behavior.

MATERIAL

The experimental group consisted of 34 naval recruits who came to the attention of the medical department during an eight-month period. All of these men had been observed, while in training, to walk in their sleep. Confirmation that this habit existed prior to enlistment was obtained through a social service agency report from each man's home town.

For control, 60 nonsomnambulistic Electronics School students were studied. The controls represent the superior enlisted man and the sleepwalkers typify the man deemed unsuitable for naval service. Accordingly, the control group was not a true random sample but was used because of military expediency. The electroencephalographic results should not be as distorted by this sampling error as would sociocultural and psychologic factors.

METHOD

In addition to an electroencephalogram, all subjects were given a thorough physical and neurologic examination. To ensure a more exact evaluation of the brain waves, an inquiry into each man's circumstances at birth, past history of sickness and injuries, periods of unconsciousness, and family history of convulsive disorders was made. The relevant related history pro-

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cured on each subject included a review of the genito-urinary system and past and family history of both somnambulism and enuresis. The major findings revealed by this inquiry are summarized in table 1.

TABLE 1. *Encephalographic and medical findings in 34 somnambulists and 60 control subjects*

Findings	Somnambulists		Controls	
	Number	Per cent	Number	Per cent
Abnormal electroencephalograms	7	20.6	1	1.7
Family history of sleepwalking	19	55.9	0	0.0
Past history of sleepwalking	34	100.0	2	3.3
Nocturnal enuresis	16	47.1	0	0.0
Past history of enuresis	21	61.8	14	23.3
Family history of enuresis	13	38.2	10	16.7
Epilepsy	3	8.8	0	0.0

Electroencephalographic tracings of all 60 controls and of 30 subjects from the experimental group were made on an Offner type ink-writing oscillograph with the technic of 12 lead monopolar and bipolar recordings, bilaterally, from the frontal, temporal, parietal, and occipital areas; and tracings of the remaining four subjects from the experimental group were made on a Grass machine, utilizing 16 leads from the same areas. All the recordings were made within a period of three hours after eating.

RESULTS

Encephalographic tracings of five of the sleepwalkers were interpreted as abnormal and two others were considered to be borderline. These seven (20.6 per cent) other than normal brain waves were characterized by poorly regulated and poorly developed alpha rhythm of 8 to 10 per second with occasional slowing of activity. Hyperventilation tended to accentuate the slow activity and cause some increase in amplitude. One (1.7 per cent) of the controls showed a borderline encephalogram. This man was enuretic until age 15, and he had immediate family members who were enuretic. His record revealed 10 per second alpha rhythm in the anterior and posterior portions of the head, with occasional slow activity (5 to 6 per second) of slightly increased amplitude.

A significant physical finding occurred in a somnambulist who had been rachitic in his first year and who had an ocular paresis of the left eye with resultant diplopia. He complained of lifelong nocturia and had a borderline normal brain wave. His younger sister was somnambulistic.

One somnambulist, age 19, had blood pressure readings of 164/96 mm Hg and, at another time, 172/92 mm Hg. His brain

wave was normal. Immediately prior to his first sleepwalking episode, another somnambulist whose electroencephalogram was normal suffered a fractured skull and while hospitalized was discovered to have Bright's disease. Still another sleepwalker with a normal electroencephalogram described classical bouts of sleep paralysis after awakening. There was no history of cataplexy or narcolepsy in this man.

No person in this study was a twin or triplet. One control had been delivered at birth by cesarean section. His electroencephalogram was normal. A sleepwalker who told of cord strangulation at birth, apparently resulting in severe asphyxia, had a normal brain wave.

One sleepwalker who received a medical discharge for epilepsy alleged difficulty at birth but was unable to furnish details. His electroencephalogram was grossly abnormal and he was observed while under investigation to have grand mal seizures. Two other men in the experimental group had been diagnosed and treated in civilian life as epileptics. One had a borderline electroencephalogram, and the other had a normal electroencephalogram. Both men described recurrent attacks which seemed to be grand mal seizures. Thus there were three epileptics among the sleepwalkers and none in the control group. Two of the known epileptics had immediate family members who walked in their sleep. Two epileptics also were enuretics. Four sleepwalkers (11.8 per cent), all with normal brain waves, complained that they frequently fell out of their beds while asleep.

On genito-urinary system review, 57 complaints were elicited from the somnambulists (table 2). Of these, all but two complaints were made by men with normal brain waves. One man complaining of burning had a borderline electroencephalogram, one complaining of pyuria had an abnormal electroencephalogram. The four complaints in the control group were made by men with normal brain waves.

Table 3 summarizes a statistical treatment of the electroencephalographic relationship.

DISCUSSION

The finding of abnormal brain waves in more sleepwalkers than nonsleepwalkers causes us to focus attention on epilepsy and the phenomenon of sleep. Aristotle, in the third century, B. C., recorded the clinical impression that, "in many cases epilepsy begins in sleep, and there are men who are seized with it when asleep but not when awake." It was toward the turn of the present century that Sir William Gowers,[2] in a monumental study of 1,658 epileptics, noted that 22 per cent had attacks only or almost only during sleep, usually occurring in the waking process. A refined study of 2,524 fits occurring in 66 epileptics was reported

TABLE 2. *Type and frequency of genito-urinary complaints in 34 somnambulists and 60 control subjects*

Complaint	Times occurring in	
	Somnambulist group	Control group
Dysuria	5	0
Difficulty initiating micturition	3	1
Difficulty ceasing micturition	4	0
Nocturia	9	0
Pyuria	3	0
Hematuria	2	0
Costovertebral angle tenderness	1	0
Frequency	9	1
Urgency	10	1
Burning	9	1
Albuminuria	1	0
Renal lithiasis	1	0
Total	57	4

TABLE 3. *Significance of findings in somnambulistic and control groups*

Findings	Observed frequency		χ^{2}*	p**	Interpretation***
	Sleepwalkers	Controls			
Abnormal EEG's	7	1	7.67	>0.01	+++
Family history of sleepwalking	19	0	38.11	>0.01	+++
Genito-urinary complaints	18	4	23.16	>0.01	+++
History of enuresis	21	10	17.6	>0.01	+++
Abnormal EEG's and history of enuresis	5	0	6.7	>0.01	+++
Abnormal EEG's and family history of sleepwalking	3	0	.03	<0.50	+
Abnormal EEG's, family history of sleepwalking, and genito-urinary complaints	3	0	.03	<0.50	+
Abnormal EEG's and genito-urinary complaints	3	0	.03	<0.50	+

*Chi-square. +Not significant

**Probability. +++Highly significant

***Frequency of occurrence under 10 depicts a trend without establishing statistical significance.

in 1929 by Langdon-Down and Brain.[3] They found that 24.2 per cent had attacks chiefly, if not exclusively, at night. Utilizing a similar technic in America, Patry[4] studied 1,013 fits and found that 19.3 per cent occurred between 2000 and 0600. Further confirmation of Gowers' work was made in an extensive study by Hopkins.[5] By 1936 Magnussen[6] was able to demonstrate that nocturnal seizures seemed most likely to occur at the greatest depth of sleep. Nearly a decade and a half later, Caveness, Parsonage, and Edmond[7] considered that depth of sleep or change in depth of sleep might be crucial in the precipitation of convulsions during sleep.

While cogitating this question it is of interest that Doust and Schneider,[8] using the Millikan oximeter, found that deeper sleep levels paralleled lower blood oxygen saturation percentages. The period of greatest anoxemia, when "life was at its lowest ebb," was from 0400 to 0500. According to Langdon-Down and Brain, this is the precise time at which the highest incidence of nocturnal seizures occur. From all this one might conclude that in the epileptic seizures which occur in relation to sleep, a factor of brain oxygen supply must be reckoned. Inasmuch as the electroencephalogram is a probable indirect index to cerebral metabolism, the abnormal brain tracings in somnambulists may reflect oxygenation inadequacy which, when impaired further during sleep, results in a "seizure" of sleepwalking. That epilepsy is associated with sleep disorders is well documented in the medical literature.[9-14]

Clinically, epilepsy is estimated conservatively as occurring in 1 of every 200 people.[15] In this series the discovery of 3 epileptics among 34 sleepwalkers, plus the unusual history in 4 other men of frequently falling out of bed while asleep, suggests that the sleepwalker is more likely to be epileptic than would a member of the general population. When it is further considered that more sleepwalkers than controls have abnormal brain waves, a relationship is implied between sleepwalking and epilepsy.

Enuresis is another immaturity habit which usually is related to sleep and which may be related to epilepsy. In the nineteenth century, Trousseau[16] lectured on the clinical and heredofamilial relationships between enuresis and epilepsy. Later, Freud[17] cautioned that nocturnal enuresis might be part of an epileptic attack. Turton and Spear[18] reviewed the literature concerning electroencephalograms and enuresis. Their own findings of abnormal brain waves in 51 per cent of 100 severely enuretic children confirmed the belief of other workers from many parts of the world that enuretics are far more likely to have abnormal brain waves.

Studies of service personnel have shown that sleepwalking is often associated with enuresis.[19,20] The study of somnambulists shows that as a group they are similar to enuretics in that they too tend to have abnormal brain waves, a marked propensity toward personal and family histories of enuresis, and chronic, multiple genito-urinary complaints.[1] In addition, the sleepwalker often has a family history of sleepwalking.

The issue of cultural and psychologic influences in sleepwalking will be discussed in a subsequent article.[21] For present purposes, suffice it to state that many of the psychologic theories of the causes of sleepwalking and enuresis have been exemplified in our undertaking. The sleepwalkers have many unresolved oedipal problems and intense sibling conflicts. The development of an actual episode of sleepwalking is commonly related to emotional problems in which the man seems to have a need to run away from the bed (as a place of temptation) or to walk to a place of protection.

We note also that many sleepwalkers commit the act in an effort to reach the toilet in order to urinate. The same mechanism operated in the situation of a half-dozen enuretics, who were indubitably sleepwalking when discovered in their naval barracks by competent observers.

Rottersman[22] inspected the histories of 100 sleepwalking selectees in World War II and found that 52 per cent of these men completely stopped sleepwalking before age 18. Our experience also has been that many servicemen can list remote past histories of symptomatic immaturity habits. The men in this study, however, are unique in that these habits persisted well into adolescence. It is in this group of men that we believe that a factor of organicity is partially culpable as the causative agent.

To substantiate this impression there are the strong familial incidence of immaturity habits and the possibility of hereditary cortical metabolic disturbance as demonstrated by abnormal electroencephalograms. Also, for many years it has been known in both the clinic and laboratory that central nervous system lesions may cause multiple deviations in the function of the urinary system.[23,24] Thus, many genito-urinary complaints that often appear to be "organic" may be secondary to a central nervous system defect which is manifested by an abnormal electroencephalogram. The proclivity to sleep disorders of various sorts in enuretics and sleepwalkers lends more weight to the hypothesis that a genetically determined anatomic impairment resulting in a biophysical aberration may explain some cases of symptomatic immaturity.

We conclude that sleepwalking and enuresis may suitably augment the system referred to by Langdon-Down and Brain when

they wrote: "Little is known at the present concerning the biochemistry of normal sleep, but further knowledge of both general and cerebral metabolism in the sleeping state may help to explain the striking but obscure relationship between sleep and epilepsy."

SUMMARY

Due to their military importance the symptomatic immaturity habits were studied for possible organic and psychologic causative factors. The ultimate goal is to effect means to salvage manpower and to improve treatment methods. This article deals with the electroencephalographic findings in sleepwalkers.

Our study of 34 sleepwalkers and 60 nonsomnambulistic Electronics School students reveals that the sleepwalkers have more abnormal brain waves (20.6 per cent to 1.7 per cent); more sleepwalkers have relatives who are sleepwalkers (55.9 per cent to 0 per cent); sleepwalkers frequently have a history, usually concurrent, of enuresis (61.8 per cent to 23.3 per cent); and they have more genito-urinary complaints (57 complaints of 34 sleepwalkers as compared with 4 complaints of 60 control subjects).

It is postulated that in the adolescent male somnambulist organic factors may provide a neuropathic basis for the observed behavior.

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WHAT IS RESEARCH

"Research is not done only in the laboratory. It may be conducted at the bedside, in the operating room, and in the field of public health and epidemiology. It is not the place that counts. It is the perspective. It is the original mind asking a question and designing an experiment to find the answer. It should not be pebble picking—it should be the building of magnificent castles. I have no sympathy for the view that any kind of research is good. Research should advance a fundamental concept or it should have an obvious practical value and early application. Research is not gadgeteering. It is the pursuit of ideas. With the development of elaborate tools, like flame photometers, ultracentrifuges, angiocardiographs, ballistocardiographs, electron microscopes, electrophoresis, and isotopes, there has developed a small group who play their instruments for all they are worth. Having acquired the equipment, the buildings, the technicians, and the project grants, they go madly searching for ideas. They scrutinize grant applications if they are on research-allocation committees, they scan published reports, they rush to meetings, they write to their friends, and they ask visiting colleagues for ideas. This is obviously all wrong. Research should start from ideas, and then tools should be obtained, not vice versa."

—LOUIS N. KATZ, M. D.
in *Journal of American Medical Association*, p. 1137, Mar. 31, 1956

PSYCHIATRIC PREDICTION AND MILITARY EFFECTIVENESS

Part 1

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THE proper selection of manpower on the basis of mental capacity and emotional stability remains an unsolved problem of military medicine. In World War II, although 12 per cent of the selectees (1,850,000 men) were rejected for mental deficiency and neuropsychiatric causes, there were approximately 1,000,000 neuropsychiatric admissions to military medical installations, and 545,000 men were discharged from the service for mental defect and diseases.[1] During the postwar years there appeared many reports of follow-up studies and experiences which supported previous impressions regarding the limitations of medical selection in general and the failure of psychiatric screening in particular.[2-6]

There still exists a continuing military requirement to develop reliable means of identifying and thus eliminating unstable and mentally unfit subjects at the induction level. Practical efficiency in selection is of vital importance in time of war and general mobilization. In World War II faulty psychiatric screening substantially reduced the manpower resources available to the Armed Forces, and seriously impeded the military effort by permitting the influx of inductees who were unable to perform satisfactory duty.

As a result of World War II experiences, some military psychiatrists felt that medical and psychiatric selection should exclude only the "lame, the halt, and the blind" or the obviously unfit, and that the basic training period should be used as a practical test of fitness for military duty.[6] This suggestion only repeats the error of equating effectiveness under one set of circumstances, *i. e.*, basic training, with effectiveness under quite

From Walter Reed Army Institute of Research, Walter Reed Army Medical Center, Washington, D. C.

different and perhaps more stressful conditions. Moreover, difficulties with such a plan are certain to arise when it becomes common knowledge that failure in training is rewarded by discharge from the service.

In the event of general mobilization, realistic considerations demand that some form of psychiatric screening be employed. The fact that effective duplicable methods of psychiatric selection are not available is a strong argument for renewed efforts to improve their accuracy or at least to eliminate selection criteria that have been found to be unreliable.

An opportunity to investigate the problems involved in the prediction of military effectiveness was presented in August 1951 in conjunction with a study initiated by Brill and Beebe.[5] Their project required ascertaining the psychiatric status of an inductee group during the Korean campaign for purposes of comparison with similar data derived from World War II participants. The present study* used the history and clinical impressions that were recorded from this inductee group for the purpose of predicting their subsequent military performance. In addition to reporting upon the results of the psychiatrist's predictions, this presentation will also explore the relationships between the separate components of the psychiatric examination and military performance.

MATERIALS AND METHODS

Subjects. From white inductees who entered six army basic training centers during late August 1951, a random sample of 505 men was selected on the basis of the last digit in their army serial numbers. The subjects originated from 43 states, Alaska, and Hawaii in the following percentages by geographic regions:

Region	*Per cent*	*Region*	*Per cent*
New England	3.6	West North Central	9.3
South Atlantic	5.7	West South Central	1.2
Middle Atlantic	30.1	Mountain	2.2
East North Central	20.2	Pacific	15.4
East South Central	11.1	U. S. Territories	1.2

Age at the time of induction shows the typical range from 17 through 26 years, with 95 per cent of the subjects falling between the ages of 19 and 24.

Psychiatric Examination. It should be recognized that the subjects of this study were not raw selectees but a group who had been medically screened and otherwise found acceptable for military service by the usual induction procedures employed during

*Source of data for this paper is *Psychiatric Prediction and Military Effectiveness*, Research Report No. WRAIR-64-56, Walter Reed Army Institute of Research (to be published).

the Korean campaign. After entry on active duty and within the early weeks of basic training, a complete psychiatric evaluation was accomplished for each subject by the senior psychiatrist assigned to the Mental Hygiene Consultation Service of the respective training center. Each of the six examiners had from 4 to 10 years of training and experience in military psychiatry.

The psychiatric examination was recorded on a special form that was designed to insure a systematic collection of data. This form required the psychiatrist to record his opinion as to subsequent usefulness of the subject if assigned to (1) a combat zone, (2) an active combat area with little or no opportunity for participation in battle, or (3) a noncombat theater of operations. Also included was a rating by the company commander, who, after the subject had completed three weeks of basic training, estimated whether he would become an outstanding, average, or poor soldier.

Rating of Military Performance. A complete extract of the service record for each of the 505 men was accomplished in 1954 after most subjects had completed the required two-year period and had been discharged. A few remained for longer periods in the Army, some to re-enlist or accept commissions, and others because of extensive hospitalization or to serve out a sentence of court martial. However, the rating of military performance for all subjects for reasons of consistency was based on the first two years of service only, whether completed or not.

The analysis of military performance was based on the following data:

1. *Information from service records* of each subject that included (a) dates of promotions and demotions; (b) military education and training; (c) combat records; (d) medals and service ribbons awarded; (e) a chronologic list of organizations and stations assigned or attached, with character and efficiency ratings given during each period; (f) pertinent extracts of admissions to army medical installations; (g) disciplinary offenses.

2. *Evaluation of military performance* by the unit commander as recorded on a questionnaire which was sent to the organization concerned in the latter part of the second year of military service. Data from this source were obtained in approximately 50 per cent of the subjects.

After consideration of the above information, the performance of each subject was rated by two of the investigators (AJG and FJR) who had considerable practical experience with the interpretation of service records and the function of troops in combat and noncombat assignments. A four-point scale of military effectiveness was established.

1. *Above average.* In this category were placed individuals whose performance fulfilled one or more of the following conditions: (a) service record notation of a superior efficiency rating for a major assignment of six or more months (military schools or training excluded); (b) positive statements by the company commander in response to the questionnaire that the subject performed outstanding service in his organization; (c) promotion to Sergeant (since only about 15 per cent of the sample attained the rank of Sergeant or higher).

An above-average rating was not given to any subject whose record indicated severe or repeated disciplinary difficulties or lengthy hospitalization for illness (psychiatric or other medical) exclusive of disease peculiar to the military environment, such as hemorrhagic fever, malaria, or battle-incurred injury, et cetera.

2. *Average.* This designation was given to individuals whose efficiency was rated as excellent during most of their service and who reached the grade of PFC (Private First Class) or Corporal. Minor disciplinary offenses and moderate periods of illness did not detract from the rating of average.

3. *Below average.* Here were included those subjects whose performance was distinctly inferior as indicated by (a) efficiency ratings of less than excellent during much of their service, or (b) statements by the unit commander that the subject was a poor soldier, and failure of promotion to PFC or demotion to Private.

Below-average ratings were also given to repeated disciplinary problems whose offenses and/or subsequent punishment caused a considerable absence from actual duty status. Similarly, frequent or prolonged hospitalization for medical (including psychiatric) reasons was rated as below-average performance.

4. *Failure.* Under this category were placed subjects who were prematurely separated from the service. Any failure to complete two years of military service was rated accordingly, unless due to combat injury or unavoidable disease, accident, or other circumstances over which it was clear that the individual had no control or influence.

The reliability of categorization was checked by an independent observer* and more than 90 per cent agreement was found.

RESULTS

Performance. Since all subjects in this study had been accepted for miliatry service in 1951 by routine induction procedures, their subsequent performance affords an opportunity to evaluate the adequacy of medical screening and other selection methods in operation during the Korean conflict. As measured by the rating criteria previously described, table 1 demonstrates that 89 per

*Capt. H. J. Williams, MC, USA, Chief of the Clinical and Social Psychology Department, Neuropsychiatry Division, Walter Reed Army Institute of Research.

cent of the group were effective soldiers during two years of military service.

TABLE 1. *Military effectiveness during two-year period*

Effectiveness	Inductees	
	Number	Per cent
Above average	146	29
Average	303	60
Below average	24	5
Failure	32	6
Total	505	100

This large proportion of successful soldiers in a random sample of inductees could be construed as strong support for the relaxed standards of psychiatric selection in practice during the Korean campaign. However, it is not generally appreciated that this liberal policy was more than offset by an increase in the number eliminated at induction for inadequate mental ability as measured by the then newly introduced Armed Forces Qualification Test (AFQT). Table 2 illustrates the percentage of inductees disqualified for all reasons during World War II and the Korean conflict.

TABLE 2. *Percentage of inductees rejected during World War II and the Korean action**

Causes for rejection	World War II 1942-1945 (per cent)	Korean action July 1950-Dec. 1953 (per cent)
Administrative	0.5	0.8
Medical (excluding neuropsychiatric)	18.2	12.9
Mental	11.5	18.7
Mental deficiency**	4.3	13.4
Neuropsychiatric	7.2	2.1
AFQT and medical***	Not applicable	3.2
Total	30.2	32.4

*From Division of Medical Statistics, Office of the Surgeon General of the Army, Washington, D. C.

**For World War II the term includes men rejected for illiteracy and for low scores on mental tests, as well as morons, idiots, and imbeciles psychiatrically determined. For Korean conflict the term is confined to those who were disqualified on the basis of the Armed Forces Qualification Test (AFQT).

***Includes all men rejected for combinations of causes where AFQT was the primary reason for rejection. No comparable category in World War II.

In World War II, standards of rejection for illiteracy and so-called mental deficiency varied from time to time and from one induction station to another. The AFQT, introduced in January 1950, was the culmination of considerable research and effort to obtain a reliable and uniform screening device for intellectual ability.[7] The increase in rejection for mental inadequacy that characterized selection in the Korean conflict may have eliminated many individuals who would have been rejected in World War II for psychiatric reasons. It should be recognized that rejections for over-all mental causes during the Korean campaign, rather than being confined to the more obviously unfit as commonly believed, were over 50 per cent more numerous than in World War II. This circumstance may have some bearing upon the relatively low incidence of psychiatric breakdown reported for the Korean period, although other influences, to be discussed below, were perhaps more important in this respect.

Outside of the fact that there was a difference between the mental screening procedures of World War II and those of the Korean campaign, it is difficult to compare the effectiveness of subjects in this study with draftees of World War II for the following reasons:

1. World War II was fought in many different geographic and climatic areas under various conditions of combat and deprivation. Draftees served from one to five years, and the length of time in combat was not specified. In contrast, the Korean conflict involved only one active theater, and during the period in which the subjects of this study participated, a static type of warfare predominated. Active duty was generally limited to two years, and because of the rotation policy introduced in the spring of 1951, the combat tour was fixed at nine months.

2. During the Korean action there was a much greater emphasis on rehabilitation and return to duty than on administrative and medical discharge. Figure 1 graphically illustrates a steady decrease in psychiatric and total medical discharge rates following World War II. Despite the moderate rise in frequency of neuropsychiatric and battle casualties during the Korean action (fig. 2), the usual wartime increases in neuropsychiatric and medical discharges did not occur.

3. Unfortunately, few studies have been made that evaluate the over-all effectiveness of World War II participants. Egan, Jackson, and Eanes[4] followed the military careers of 2,054 selectees who had been rejected on at least one occasion for neuropsychiatric reasons and later inducted into the Army. Discharge from the service for psychiatric abnormality was the sole criterion used for designating performance as unsatisfactory. On this basis they found that 82 per cent of the men in their series had performed satisfactory duty as compared to 94 per cent of all enlisted per-

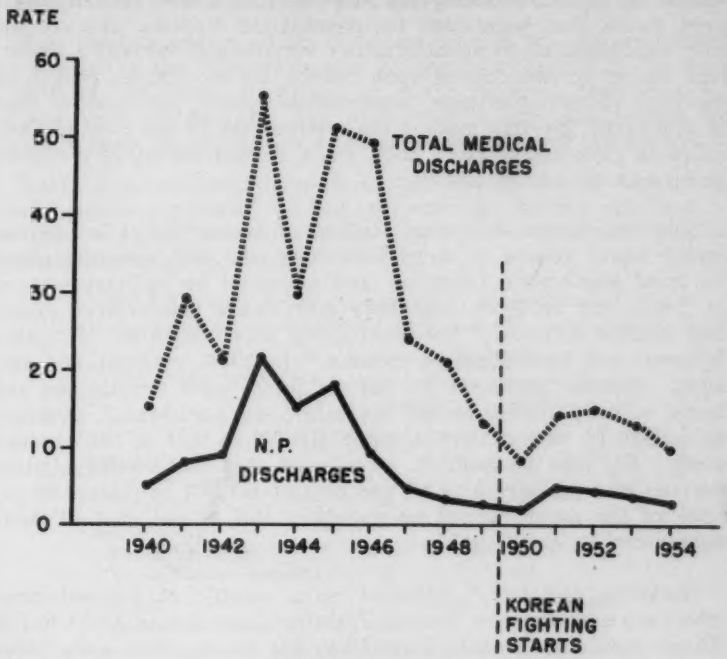

Figure 1. Annual rate of discharge for disability.

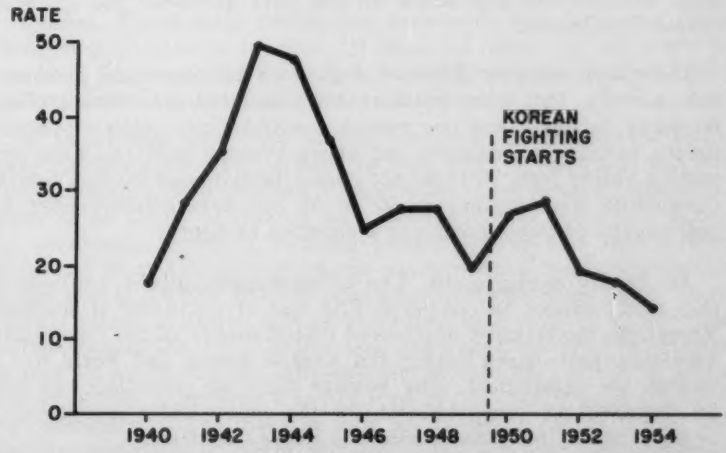

Figure 2. Rate of admissions per 1,000 mean strength for all neuropsychiatric conditions in the United States Army from 1940 to 1954. (From Medical Statistics Division, Office of the Surgeon General)

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sonnel in the Army during the same period. These investigators were aware that separation for psychiatric disorder was not the only manifestation of unsatisfactory service and devised a numerical rating system based upon reason for discharge, length of service, efficiency ratings, court martial record, and rank at time of discharge. By this method they found that 78 per cent of their subjects gave satisfactory duty, but a similar survey of a control group was not accomplished.

Aita[8] conducted follow-up studies of two different but numerically equal groups of Army inductees who had been evaluated by brief psychiatric interview and accepted for military service in 1941. One category contained individuals "considered excellent soldier material;" the other group was comprised of "likely failures and borderline candidates." In 1946, medical and personal records pertinent to the subjects were scrutinized and their military performances classified as successful, average, or failure by rating criteria quite similar to that of the present study. By this method, it was found that successful military service was performed by 87 per cent of all 304 subjects, 95 per cent of the group judged as superior, and 79 per cent of those considered as questionable.

Ginzberg and Bray[9] followed up a sample of 400 selectees who were sent to Army Special Training Units during World War II. These men were mostly illiterates, but among them were "slow learners" who had failed the Army mental tests. They found that about 75 per cent of this group performed adequately in regular duty assignments and about 25 per cent achieved the grade of Corporal or higher.

The above studies illustrate a common and important phenomenon, namely, that when soldiers are evaluated for over-all effectiveness during a wartime period a surprisingly large proportion render seemingly adequate and above-average service. This proportion varies from 70 to 80 per cent effectiveness for individuals considered as marginal to 90 to 95 per cent effectiveness for individuals estimated to be in a superior category.

To briefly recapitulate: The effectiveness of the subjects in this study cannot be compared with that of World War II draftees. Therefore, the relative degrees of effectiveness of the psychiatric selection procedures during the Korean period and World War II cannot be determined. The results thus far observed can only be regarded as characteristic for the group under investigation or perhaps for inductees during the Korean conflict.

Attention can now be directed toward considering the accuracy of psychiatric predictions for later military usefulness.

PREDICTION VS. PERFORMANCE

The military career of the subjects was in no way influenced or altered by the impressions or judgments obtained by the psychiatrists. Subjects continued in basic training, then received further advanced training and were sent to duty stations on the basis of their qualifications and the requirements of the service.

Table 3 gives the geographic distribution of the principal duty assignments performed by the subjects as further modified to conform with the three levels of stress for which prediction of performance has been made.

TABLE 3. *Principal duty assignments by geographic area*

Assignment and area	Inductees	
	Number	Per cent
Noncombat	295	58
Zone of interior	112	22
Overseas	183	36
Active theater	110	22
Korea, rear zone	51	10
Korea, combat support	59	12
Combat	100	20
Korea, front line	100	20
Total	505	100

Combat. Psychiatric predictions were made on a four-point scale from above average to poor for each of three major areas of stress.* The result of this effort for subjects who were assigned to front-line combat units is shown in table 4.

It is evident that none of the forecasts for below-average or poor performance was correct. Indeed, only 7 subjects rendered unsatisfactory duty whereas 21 had been considered as questionable or as likely to fail. It may be argued that the above errors in prediction occurred because combat stress was less severe than had been anticipated by the psychiatrists or experienced in World War II. Of the 100 subjects assigned to combat units, there were 4 killed in action and 14 wounded. This ratio of 18 per cent battle casualties is probably less than that suffered by combat troops in World War II. Although comparable statistical data are not available, there was a battle loss of 36.5 per cent in the combat elements of one division over an 11-month period during the Italian campaign of World War II.[10] The fact that the degree of

*Predictions were originally made on a five-point scale which has been modified to correspond with the four-point rating of performance.

battle trauma which may be encountered cannot be predicted is one of the inherent defects in any effort to predetermine combat effectiveness.

Despite the foregoing evidence of only moderate combat severity in the Korean campaign of 1952 and 1953, table 4 indicates that psychiatric prediction of behavior in combat was unduly pessimistic. This attitude of the psychiatrists is not surprising, since battle is considered to be the most severe form of military stress and therefore the logical situation to produce a breakdown of so-called predisposed or vulnerable individuals. However, such a simple stress-predisposition formula ignores the powerful supportive influences that may come from buddies, group unity, leadership, and other circumstances of the combat situation.[11]

TABLE 4. *Prediction vs. performance in combat (total sample)*

Performance	Prediction				
	Above average 20	Average 59	Below average 12	Poor 9	Total 100
Above average	9 (45%)*	24	3	2	38
Average	11	31 (52%)*	8	5	55
Below average	0	3	0 (0%)*	2	5
Poor	0	1	1	0 (0%)*	2

*Correct prediction

The examining psychiatrists of this study were not alone in their inability to accurately predict future combat effectiveness. Plesset,[12] a division psychiatrist in World War II, reported that many individuals who were considered to be poor risks prior to combat functioned adequately under battle conditions, and relatively few became psychiatric casualties. Similar results were obtained by Glass[10] in an effort to predict the combat effectiveness of infantry replacements by psychiatric evaluation. Indeed, it is the rule rather than the exception for psychiatrists and others to underestimate the capacity of individuals to perform satisfactory combat duty.

Combat Support Zone. This category includes Army and division service troops, such as engineer, signal, medical, ordnance, headquarters, and other units that function immediately to the rear of the actual fighting and are awarded battle stars for their participation. Combat casualties are rarely incurred by these units except under unusual circumstances, such as an unexpected enemy breakthrough. They suffer relatively little of the physical deprivations and discomforts commonly endured by front-line troops. Mauldin,[13] the well-known World War II cartoonist, in a

somewhat uncharitable but apt caption to one of his drawings, referred to individuals of this category as "garritroopers" who were "too far forward to wear ties and too far back to git shot." For the purpose of this study, combat support units were considered similar to rear echelon assignments in Korea insofar as battle stress was concerned, and performance in these units has been compared with prediction for duty in an active theater.

Table 5 demonstrates that the examining psychiatrists also underestimated the performance capabilities of the combat support group. Ninety-six per cent of these subjects gave satisfactory service in contrast to 70 per cent that were so predicted. It is probable that such gross errors in psychiatric prediction are based upon a failure to consider the unique and favorable situational advantages that are enjoyed by men assigned near the combat zone. Here, proximity to the actual fighting provides some of the excitement of combat with little of the risk. Furthermore, troops in such a role have a tangible, worthwhile objective, namely, to support and supply the less fortunate front-line troops who must bear the brunt of danger and deprivation. Practical experience indicates that relatively few psychiatric situational disorders occur in men assigned to this area.

TABLE 5. *Prediction vs. performance in a combat support zone (total sample)*

Performance	Prediction				Total	
	Above average 20	Average 21	Below average 13	Poor 5	No.	%
					59	100
Above average	15 (75%)*	6	2	0	23	39
Average	5	15 (71%)*	10	4	34	57
Below average	0	0	0 (0%)*	1	1	2
Poor	0	0	1	0 (0%)*	1	2

*Correct prediction

Rear or Logistical Zone. Individuals in this category also perform support and supply functions but are even further removed from the active combat area. In this study they are represented by the subjects assigned to the rear in Korea. Table 6 gives their effectiveness as contrasted with psychiatric prediction.

Similar to the previous results, effective performance (90 per cent) was better than anticipated. None of the subjects rendered poor performance, but there were five instances of below-average duty. The over-all performance of the rear echelon group in Korea was somewhat less effective than that of subjects assigned to the combat support zone or front-line combat. There are situational circumstances peculiar to the rear or logistical zone of an active theater which adversely influence effectiveness, namely:

1. Personnel assigned to rear units are quite removed from the battle scene and cannot readily perceive the results of their work or the importance of their role in the over-all military effort.

2. Boredom and the frustrations of monotonous living are common, along with a greater opportunity to indulge in activities which lead to disciplinary infractions.

It should be apparent that each level of a combat theater has its own specific situational circumstances which play a larger role in determining the over-all effectiveness of assigned personnel than previous personality characteristics or so-called predisposition.

TABLE 6. *Prediction vs. performance in rear echelon groups in Korea (total sample)*

Performance	Prediction				Total	
	Above average 9	Average 28	Below average 12	Poor 2	No.	%
					51	100
Above average	3 (34%)*	7	1	0	11	22
Average	6	18 (64%)*	10	1	35	68
Below average	0	3	1 (8%)*	1	5	10
Poor	0	0	0	0 (0%)*	0	0

*Correct prediction

Noncombat Overseas Theater. This category includes subjects who served in such noncombat theaters as Japan, Germany, the Canal Zone, and Alaska. The performance of this group as related to psychiatric prediction is given in table 7. This predictive effect also indicates a similar underestimation of ability to endure military stress, in this instance, separation from home and the United States.

Zone of the Interior. Subjects in this category remained in the United States during their entire tour of military service. Presumably such assignment represents the least amount of external stress and, therefore, the most favorable environment for satisfactory adjustment. Table 8 gives the results of prediction for duty in a noncombat area.

From a scrutiny of table 8, one might be led to conclude that the United States was the most stressful of all duty areas, since almost one fourth of the assigned subjects were unable to complete two years of military service. In actuality this result is an artefact, because most of the failures (16 out of 26) occurred during or shortly after the training phase or within a 5-month period after induction. Thus, failure in the zone of the interior

primarily indicates difficulties that were encountered in the transition from civil to military life rather than the influence of conditions peculiar to service within the United States.

TABLE 7. *Prediction vs. performance in overseas noncombat theaters (total sample)*

Performance	Prediction				Total	
	Above average 46	Average 94	Below average 35	Poor 8	No. 183	% 100
Above average	14 (30%)*	17	3	1	35	19
Average	31	72 (77%)*	27	5	135	74
Below average	0	4	4 (11%)*	2	10	5
Poor	1	1	1	0 (0%)*	3	2

*Correct prediction

TABLE 8. *Prediction vs. performance in the zone of the interior (total sample)*

Performance	Prediction				Total	
	Above average 43	Average 42	Below average 18	Poor 9	No. 112	% 100
Above average	25 (58%)*	9	5	0	39	35
Average	15	23 (55%)*	5	1	44	39
Below average	0	0	3 (17%)*	0	3	3
Poor	3	10	5	8 (89%)*	26	23

*Correct prediction

Psychiatric prediction achieved a superior efficiency in identifying subjects (88.8 per cent) who failed in the zone of the interior or early in their military career in contrast to the negative results that were obtained in the individuals of this category who were sent overseas. It would seem reasonable to postulate that overt signs of psychiatric or mental abnormality can forecast later adjustment over a relatively brief time period provided the environment is not radically altered, as occurs under conditions of overseas or combat assignment.

The entire matter of accuracy in psychiatric prediction was re-evaluated on the basis of a more simplified scoring system which rated prediction and performance as either (1) satisfactory, which combined the former average and above-average criteria, or (2) unsatisfactory, that represented both previous categories of below average and poor or failure. With this method, correct estimations were made by the psychiatrists in 78 per cent of the

subjects assigned to nonbattle areas (United States and overseas noncombat theaters), 72 per cent of the subjects stationed in an active theater (rear echelon in Korea and combat support zone), and 78 per cent of those sent to combat units. This relative similarity in the efficiency of prediction for all types of assignment reflects the inability of the examining psychiatrists to distinguish any particular vulnerability that might be specific for each of the three levels of stress. In fact, no such differentiation was attempted for must subjects, and usually psychiatric predictions were identical for assignment in combat, an active theater, or a noncombat zone. The results of the simplified scoring system are shown in tables 9 and 10.

TABLE 9. *Efficiency of prediction for satisfactory performance (total sample)*

Area	Above average or average		Efficiency of prediction (per cent)
	Prediction	Performance	
Zone of interior	85	72	85
Overseas noncombat	140	134	96
Rear Korea	37	34	92
Combat support zone	41	41	100
Combat (front line)	79	75	95
Total	382	356	93

TABLE 10. *Efficiency of prediction for unsatisfactory performance (total sample)*

Area	Below average or poor		Efficiency of prediction (per cent)
	Prediction	Performance	
Zone of interior	27	16	59
Overseas noncombat	43	7	16
Rear Korea	14	2	14
Combat support zone	18	2	11
Combat (front line)	21	3	14
Total	123	30	24

Table 9 illustrates that the psychiatrists attained a high degree of accuracy in their selection of subjects for satisfactory service. However, except for assignment in the United States, their predictions of unsatisfactory duty were usually erroneous (table 10). It is this inability to determine in advance the potential

below-average or poor soldier that is the basic unsolved difficulty of psychiatric selection. In general, too many individuals are considered to be of unsatisfactory caliber or of questionable value for military service. The larger number of correct predictions of unsatisfactory service in those subjects who served in the United States confirms the impression gained from table 8, namely, that some early military failures manifest sufficient or unmistakable evidence of such abnormal tendencies at induction or during basic training, which permits a more reliable estimation of later performance. In fact, three of the subjects who were rated as poor risks by the psychiatrists were being processed for premature discharge from the service at the time of the psychiatric examination. However, efforts to estimate later unsatisfactory performance past the initial months of service are most difficult because of a greater number of unforseeable events which may operate for or against successful adjustment.

The data of this study presented an opportunity to compare the efficiency of psychiatric prediction with that of line officers. Their judgments of military usefulness were based entirely upon information relative to the behavior of the subjects during three weeks of basic training. In fact, since company commanders cannot be expected to have personal knowledge of each trainee within a three-week period, it is quite likely that the major sources of their information concerning the subjects were observations of sergeants and other members of the training cadre.

Unit commanders rated each man on a three-point scale (outstanding, average, or poor) without reference to any particular area of duty assignment. When the simplified scoring criteria of satisfactory and unsatisfactory were applied, forecasts by the line officers were found to be 84 per cent correct as compared to 76 per cent correct for all psychiatric predictions. Results of line-officer estimation for satisfactory and unsatisfactory duty are illustrated in table 11.

TABLE 11. *Efficiency of prediction by training officers*

Rating	Prediction	Performance	Efficiency of prediction (per cent)
Satisfactory (outstanding or average)	444	407	92
Unsatisfactory (poor)	59	17	29
Total	503*	424	84

*Two cases not rated by training officers.

Table 11 demonstrates that the company commanders were also unable to identify unsatisfactory subjects with a high degree of accuracy. The judgments of training officers as to future performance were remarkably similar to the effectiveness of psychiatric prediction despite the difference in training and experience between psychiatrists and line officers and the fact that dissimilar types of information were used by each group in arriving at decisions for later military usefulness.

The results of line officers' predictions cast strong doubts on the frequently repeated statement that basic training itself should be used as a practical screening device for military service.[6] Possibly the unit commanders' predictions of unsatisfactory performance might have improved if more time were available for observation. However, the potential inadequacy of most men who failed was not distinguishable by line officers within the first three weeks of basic training.

The somewhat less effective predictions of psychiatrists were due largely to their tendency to overestimate the size of the failure group. This tendency to overestimate failure can be ascribed at least in part to psychiatrists' acute awareness of personality deviations, potential neurosis, and latent abnormal behavior in the subjects. The greater technical knowledge of psychiatrists insures that a large number of potentially deviant and seemingly vulnerable subjects will be identified. However, if predictions of future performance are made primarily on the basis of defective personality or predisposition with little regard to later situational factors, many errors in prediction are inevitable.

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(To be concluded)

PSYCHONEUROTIC PATIENTS—YEARS LATER

A follow-up study of a representative sample of World War II veterans who had suffered psychoneurotic breakdown during their military service also showed generally favorable results with respect to their condition at time of follow-up about five years after their breakdown. In this study most of the veterans were interviewed by psychiatrists at follow-up. It was found that 85 per cent of the men were gainfully employed, and all but a small proportion of these were in full-time employment. Two thirds of them had had no psychiatric treatment after discharge from the service, and in only 2 per cent had there been intensive or prolonged treatment by psychiatrists. Less than 10 per cent showed evidence at follow-up of serious psychiatric disability.

—*Statistical Bulletin*
Metropolitan Life Insurance Company
p. 3, Apr. 1955

NATIONAL RESOURCES CONFERENCES
1956 – 1957

The National Resources Conferences are presented in 16 cities each year by a team of Army, Navy, Marine, and Air Force officers from the faculty of the Industrial College of the Armed Forces. The Conference seeks to foster a better understanding of the many interrelated problems associated with national security, including economic, social, political, military, psychological, and technological factors.

Each conference is a 2-week session, 4 hours each day and 5 days a week. Applications for attendance at the Conferences should not be sent to the Industrial College. Military officers who wish to attend should apply through normal official channels. Active duty training credits are provided for by pertinent regulations.

The Conference schedule for 1956-1957 is as follows:

Birmingham, Ala.	17 Sept. – 28 Sept. 1956
Denver, Colo.	24 Sept. – 5 Oct. 1956
Tucson, Ariz.	22 Oct. – 2 Nov. 1956
Butte, Mont.	22 Oct. – 2 Nov. 1956
Hartford, Conn.	26 Nov. – 7 Dec. 1956
Augusta, Ga.	26 Nov. – 7 Dec. 1956
Ventura, Calif.	21 Jan. – 1 Feb. 1957
Beaumont, Tex.	21 Jan. – 1 Feb. 1957
Jacksonville, Fla.	18 Feb. – 1 Mar. 1957
Roanoke, Va.	18 Feb. – 1 Mar. 1957
San Antonio, Tex.	18 Mar. – 29 Mar. 1957
Akron, Ohio	18 Mar. – 29 Mar. 1957
Hutchinson, Kans.	15 Apr. – 26 Apr. 1957
Providence, R. I.	15 Apr. – 26 Apr. 1957
New York, N. Y.	6 May – 17 May 1957
San Diego, Calif.	13 May – 24 May 1957

DIFFERENTIATION OF THE CLOSTRIDIA ASSOCIATED WITH MEDICAL SPECIMENS

A Biochemical Method

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THE ROUTINE differentiation of the members of the genus *Clostridium* in the average hospital laboratory is a source of frustration to both clinician and bacteriologist.[1,2] Although organisms belonging to this group are less often encountered than pathogenic species of other genera, their recognition is of equal importance. The presence of any toxigenic clostridia in a wound may result in serious complications unless rapid diagnosis and subsequent treatment are afforded. The ability of certain clostridia to liberate powerful toxins, which affect the patient physiologically while causing only minimal early local reactions, is one of the insidious features of this group of organisms.[3-5] The ubiquity of clostridia in the normal human environment affords ample opportunity for them to gain entrance into a wound, whether externally or internally induced.[6-10]

The standard methods used for culturing routine laboratory specimens of human origin are woefully inadequate for the isolation of clostridia. Not only are the species of *Clostridium* fastidious in their nutritional and physical requirements[11,12] but they are usually outgrown by coexisting aerobic species in media containing the necessary factors for their proliferation. In instances where methods are employed that enable the isolation of all members of the genus *Clostridium* in pure culture, the determination of the physiologic characteristics of the isolated strains presents additional difficulties. Media used for the detection of biochemical reactions of the aerobic bacteria are not favorable for the multiplication of clostridia. This necessitates the use of a specific set of media which will support optimal growth of the clostridia and insure reproducible results.

The interpretation of the findings may be a further complicating factor, for various workers ascribe different characteristics to the same species.[13-15] Some taxonomic keys are not consistent

From the 406th Medical General Laboratory, APO 343, San Francisco, Calif.

throughout in reporting the reactions used, making it difficult to find mutually exclusive reactions.[13] Other keys depend upon a single reaction to separate closely related species.[14] If for some unforeseen reason the key reaction is altered, an erroneous classification results. Where time is a critical factor, which is the case in most gas gangrene studied, it is impossible to perform repeated studies to verify the results before rendering a report.

Many rapid screening tests have been devised for the presumptive identification of the more common pathogenic clostridia.[16-20] These tests are of great value but they eliminate in no way the necessity for the isolation, study, and identification of the entire microbial flora present in a given specimen.

In an earlier communication a rapid method for the isolation of clostridia from grossly contaminated cultures by selective inhibition of the aerobic flora was advanced.[21,22] The purpose of this article is to present a further step in clostridial studies, that is, to describe a method for differentiating the more common clostridia. The media used are described and the biochemical reactions obtained are enumerated and compiled into a chart which, with two exceptions, is mutually inclusive for all species of *Clostridium* tested. The key is set up to give as many points of species differences as possible without becoming unduly complex.

MATERIALS

All media here described were adjusted to pH 7.4, dispensed in 10 ml amounts into culture tubes (15 by 125 mm), and sterilized by autoclaving for 15 minutes at 15 pounds' pressure unless otherwise noted in the text. The media were stored at room temperature until used. If excess oxidation occurred during the time of storage, the media were heated to drive off the absorbed oxygen and cooled rapidly just prior to being inoculated.

The compositions of the various media used to determine the physiologic reactions of the genus *Clostridium* were as follows:

Sugar-Free Thioglycollate Broth for Fermentation Reactions

Nutrient broth*	8.0 g
Pancreatic digest of casein*	5.0 g
Sodium thioglycollate	1.0 g
Sodium chloride	2.5 g
Agar	0.8 g
Distilled water	1.0 L
Resazurin (0.1 per cent solution)	1.0 ml

With the exception of starch and inulin, all carbohydrates were added in 1 per cent concentration prior to tubing and sterilizing. Starch and inulin were added in 0.4 per cent concentration.

*Baltimore Biologics Laboratory or the Difco Laboratories.

Indol Medium

Pancreatic digest of casein*	10.0 g
Sodium chloride	5.0 g
DL-tryptophane	0.5 g
Dextrose	1.0 g
Agar	1.0 g
Distilled water	1.0 L

Nitrate Medium

Pancreatic digest of casein*	10.0 g
Sodium chloride	5.0 g
Beef extract*	2.5 g
Sodium thioglycollate	1.0 g
Potassium nitrate	1.0 g
Distilled water	1.0 L
Resazurin (0.1 per cent solution)	1 ml

Motility Medium

Thioglycollate broth*	29.5 g
Agar	4.2 g
Distilled water	1.0 L

Gelatin Medium

Thioglycollate broth*	29.5 g
Gelatin	60.0 g
Sodium sulfite	0.1 g
Distilled water	1.0 L

Bromocresol Purple Iron-Milk

Whole milk (homogenized)	1.0 L
Bromocresol purple (0.4 per cent)	4.0 ml

Ten ml aliquots of this medium were dispensed into 16- by 150-mm tubes, each containing 1 iron nail.

Acrolein Medium

Yeast extract (10 per cent solution)	50.0 ml
Pancreatic digest of casein*	15.0 g
Agar	0.8 g
Glycerol	20.0 ml
Sodium thioglycollate	0.5 g
Sodium chloride	2.5 g
Cysteine hydrochloride (1 per cent solution)	5.0 ml
Distilled water	930.0 ml

The prepared medium was dispensed in 100 ml aliquots into 4 oz prescription bottles. The sterile bottled medium was stored in a refrigerator, and, just prior to inoculation, 2.5 ml were transferred to a 18- by 100-mm Wassermann tube.

*Baltimore Biologics Laboratory or the Difco Laboratories.

Hydrogen Sulfide Medium

Trypticase iron lactose agar medium* was used to determine the production of hydrogen sulfide.

Toxin-producing Medium

Two media were found satisfactory for the production of clostridial toxins and were used alternately in this laboratory.

Ross's Horse Muscle Infusion Broth[23]

Horse muscle infusion broth	700 ml
Papain digest of horse muscle	10 ml
Cooked horse meat particles	300 g

Modified Robertson's Chopped Heart Medium[24]

Chopped beef heart	450 g
Proteose peptone No. 3*	20 g
Dextrose	2 g
Sodium chloride	5 g
Sodium hydroxide (1N solution)	30 ml
Distilled water	1 L

The prepared broth was dispensed into screw-capped tubes (15 by 150 mm), and a sufficient amount of chopped meat particles was added to make up 30 per cent of the final volume.

Yeast Extract

Dehydrated yeast	10 g
Distilled water	100 ml

The 10 per cent solution of yeast extract was prepared by boiling the dehydrated yeast in distilled water for 10 to 15 minutes. The mixture was filtered through gauze and cotton and placed in a refrigerator for 48 hours. The supernatant was then decanted and sterilized by Seitz filtration.

Production of Hydrogen Gas for Anaerobiosis

Hydrogen gas for charging Brewer jars was generated by using zinc and 30 per cent hydrochloric acid in a generator designed by Sanders and reported in the 406th Medical General Laboratory Annual Report.[25] Figure 1 shows the component part of the apparatus.

METHODS

Once a strain was isolated in pure culture, two tubes of sugar-free thioglycollate broth were inoculated and incubated for 18 to 24 hours. These tubes were used as seed cultures for the biochemical examinations.

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*Baltimore Biologics Laboratory or the Difco Laboratories.

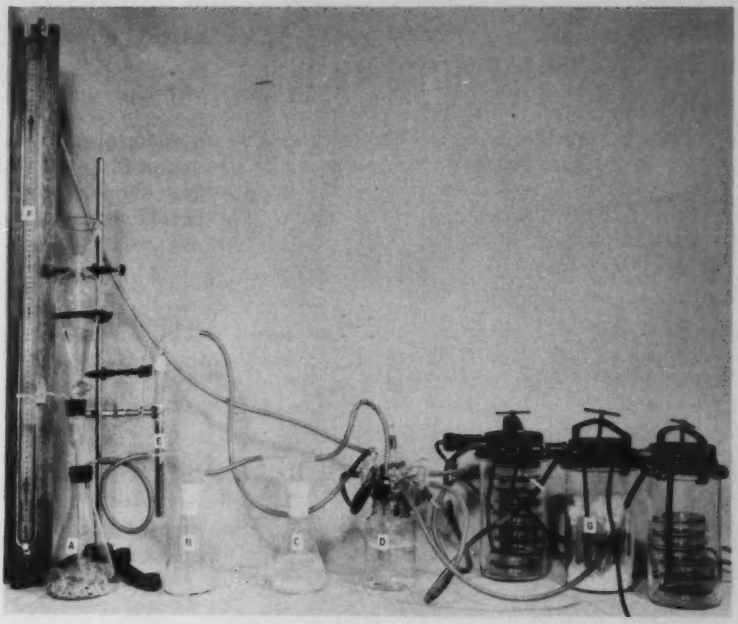

Figure 1. Hydrogen generator apparatus for Brewer anaerobic jars. (A) *Generator: mossy zinc and 30 per cent hydrochloric acid;* (B) *one per cent silver nitrate solution rinse;* (C) *water rinse;* (D) *distributor jar with water rinse;* (E) *mercury column safety valve;* (F) *manometer;* (G) *Brewer anaerobic jars.*

Sets of tests comprised of the following media were used: bromocresol purple iron-milk medium; carbohydrate fermentation medium with glucose; lactose; sucrose; maltose; salicin; mannitol; starch; galactose; glycerol; inulin; trehalose; mannose and alpha-methyl-glucoside, respectively; indol medium; nitrate medium; motility medium; gelatin medium; hydrogen sulfide medium; acrolein medium; and toxin-producing medium. All except the last two were each inoculated with 0.3 ml of the culture below the surface, using a 5 ml pipet. Acrolein and toxin-producing media were inoculated with 0.5 ml each in the same manner. Solid media were stabbed. All tests, with the exception of the indol medium, were incubated aerobically. The indol test medium was incubated anaerobically in a Brewer jar in hydrogen atmosphere. Reactions were read after 48 hours and recorded.

Pathogenicity tests were performed at the same time by inoculating 0.8 ml of the whole culture in toxin-producing broth into the right hind leg of a guinea pig weighing about 400 grams. The leg was disinfected and traumatized with a hemostat before the

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injection. Daily observations were made on the animals for local lesions, and autopsy was performed on those animals which died to determine the cause of death.

RESULTS

Table 1 gives the results of the reactions used for the classification of the clostridia more commonly encountered in laboratory specimens of human origin. All media used supported the growth of every *Clostridium* strain tested. The reactions were as follows:

Bromocresol Purple Iron-milk. Species producing the "stormy fermentation" reaction in milk did so without exception during the first 24 hours of incubation. Organisms which reacted with "acid digestion" were less active, usually requiring 48 hours to complete the process. Acid clot reactions were observed to be complete after 48 hours' incubation, while the group of organisms that were not supposed to alter milk, that is, the "no change" group of clostridia, did not alter the milk after 10 days' incubation.

Several forms of milk were tested as substitutes for whole milk. The most uniform results were obtained by using reconstituted homogenized whole milk. Satisfactory results were obtained also by using powdered whole milk in 10 per cent concentration. Skimmed milk did not give reproducible results with strains isolated in this laboratory.

Carbohydrate Fermentation. Acid production from various carbohydrates was determined by adding 1 ml of 0.04 per cent bromocresol purple indicator solution after 48 hours' incubation. The indicator solution was not incorporated into the media prior to inoculation since *Clostridium* strains reduce organic indicators to a leuco state. Thus the indicator had to be added after the incubation.

Since all species did not produce the same degree of acidity, two tubes in each set were used as controls. Dextrose was invariably fermented by every strain capable of attacking any carbohydrates and was, therefore, used as a positive control. A tube of sugar-free thioglycollate broth inoculated at the same time as the biochemical tests was used as the negative control. This was considered necessary because certain species are capable of attacking the basal medium with an alteration of pH and production of gas. For this reason, gas formation was not recorded. With these two extremes for the indices of acid production, all other carbohydrates were read as positive, doubtful, or negative.

Indol Production. The production of indol was detected by adding 1 ml of Kovac's reagent to the test culture and inverting the

test tube to facilitate mixing. A positive test was manifested by the appearance of a distinct wine-colored layer above the medium.

The use of a medium containing a reducing agent, such as sodium thioglycollate, did not give satisfactory results in this laboratory in testing for indol formation.

Reduction of Nitrate to Nitrite. The presence of nitrite was determined by using Tittsler's method. The appearance of a red color upon the addition of 1 ml each of the two reagents was recorded as a positive test. The production of nitrite was the criterion for a positive test. If the reduction continued beyond the nitrite stage, the test was considered negative.

Motility. Motility was manifested by uniform turbidity in the semisolid thioglycollate medium, while nonmotile organisms showed a discrete line of growth along the stab. Some difficulties were encountered with certain species of *Clostridium perfringens* which produced excessive quantities of gas in the medium. This nonmotile organism was found to grow profusely along the fracture lines caused by the gas formation, which on cursory examination could be interpreted as motility. Closer observation of the submerged colonies, however, demonstrated the nonmotile nature of this species.

Gelatin Liquefaction. Liquefaction of gelatin was considered to have occurred when the inoculated medium failed to solidify when placed in a refrigerator at 4°C for 1 hour. The strains capable of digesting gelatin liquefied the medium after 48 hours' incubation, and strains that were incapable of digesting gelatin within 48 hours remained negative even after 10 days' incubation.

Acrolein Production. Production of acrolein is specific for *Cl. perfringens* among the obligate, spore-forming anaerobes. Heller's method,[14] using modified Schiff's reagent to determine the formation of acrolein from thioglycollate-glycerol medium, together with the "stormy" fermentation of milk, were used as presumptive tests for identifying *Cl. perfringens*. All strains of this species, however, did not form acrolein. A negative test, therefore, does not rule out a *Cl. perfringens*. Classification in this case should be made on the basis of the results obtained from the evaluation of all the other biochemical tests.

Hydrogen Sulfide Production. The production of hydrogen sulfide was revealed by varying degrees of blackening of the medium, depending upon the species tested. Any darkening of the test medium was considered as a positive test.

TABLE I. PHYSIOLOGIC REACTIONS OF COMMONLY OCCURRING CLOSTRIDIA

	Iron - Milk	Hydrogen sulfide	Indol	Gelatin	Nitrate Reduction	Motility	Pathogenicity (Guinea Pig) (Hemolysis (Horse Blood))	Dextrose	Maltose	Sucrose	Lactose	Salicin	Mannitol	Starch	Galactose	Glycerol	Inulin	Trehalose	Mannose	α-Methylglucoside	Spores	Miscellaneous
Cl. perfringens, A-F	St	V	–	V	V	–	+	+	A	A	A	A	V	–	A	A	V	V	A	A	V	O,S	1,6
Cl. butyricum	St	–	–	–	–	+	–	–	A	A	A	A	A	A	A	–	A	–	A	A	O,S	
Cl. multifermentans	St	–	–	–	+	+	–	+	A	A	A	A	A	–	A	A	A	A	A	A	A	O,S	
Cl. beijerinckii	St	–	–	–	–	+	–	–	A	A	A	A	A	A	–	A	–	A	A	–	A	O,S	
Cl. pasteurianum	St	–	–	–	–	+	–	–	A	A	A	–	A	–	–	A	–	A	*	*	*	O,S	
Cl. tertium	ACG	–	–	–	+	+	–	+	A	A	A	A	A	A	A	A	–	–	A	A	–	O,T	M
Cl. paraputrificum	ACG	+	–	–	–	+	–	–	A	A	A	A	A	–	A	A	–	–	*	*	*	O,T	
Cl. cerofoetidum	ACG	+	–	+	–	+	–	–	A	A	–	A	A	–	–	A	–	–	A	A	–	O,S	1
Cl. septicum	ACG	–	–	+	+	+	+	+	A	A	–	A	A	–	–	A	–	–	A	A	–	O,S	
Cl. chauvoei (feseri)	ACG	–	–	+	–	+	+	+	A	A	A	A	–	–	–	A	–	–	–	–	–	O,S	
Cl. fallax	ACG	+	–	–	+	+	+	+	A	A	A	V	V	–	A	A	–	V	A	A	–	O,S	1
Cl. sphenoides	AC	–	–	–	+	+	–	+	A	A	V	A	A	V	V	A	–	–	–	A	–	R,T	
Cl. hemolyticum	AC	+	+	+	–	+	+	+	A	–	–	–	–	–	–	A	A	–	–	A	–	O,S	2
Cl. botulinum, B-E	A	–	–	+	–	+	+	+	A	A	–	–	–	–	–	A	–	A	–	A	A	O,S	3
Cl. botulinum, A-B	ADB	+	–	+	–	+	+	+	A	A	–	–	A	–	V	–	A	–	A	–	A	O,S	4,5
Cl. novyi, A-B	ACDB	+	–	+	–	+	+	+	A	A	–	–	V	–	V	–	V	–	A	–	A	O,S	
Cl. sporogenes	ADB	+	–	+	–	+	–	+	A	A	–	–	V	–	–	V	V	–	A	–	A	O,S	5
Cl. fibelliferum	ADB	+	–	+	–	+	–	+	A	A	A	–	V	–	–	V	V	–	A	–	A	O,S	
Cl. bifermentans	ADB	+	+	+	–	+	–	+	A	A	–	–	V	–	–	–	V	–	–	A	–	O,S	
Cl. sordelli	ADB	+	+	+	–	+	+	+	A	A	–	–	V	–	–	–	V	–	–	A	–	O,S	
Cl. histolyticum	ADB	+	–	+	–	+	+	+	–	–	–	–	–	–	–	–	–	–	–	–	–	O,S	M
Cl. lentoputrescens	PD	+	+	+	–	+	–	+	V	–	–	–	–	–	–	–	–	–	–	–	–	R,T	
Cl. capitovale	A(C)	+	–	+	–	+	–	+	A	–	–	–	–	–	–	A	–	–	–	A	–	O,T	
Cl. tetani	(A)(Nc)	+	+	+	–	+	+	+	–	–	–	–	–	–	–	–	–	–	–	–	–	R,T	
Cl. cornis	G	–	–	–	–	+	+	+	A	A	A	A	A	–	–	A	–	–	–	–	–	O,T	M
Cl. tetanomorphum	Nc	–	–	+	–	+	–	+	A	A	–	–	–	–	–	–	–	–	–	–	–	R,T	
Cl. difficile	Nc	+	–	–	–	+	+	–	A	–	–	–	A	A	–	–	–	–	–	A	–	O,S	
Cl. cochlearium	Nc	–	–	–	–	+	–	+	–	–	–	–	–	–	–	–	–	–	–	–	–	O,T	

KEY:
A, acid; B, blackening; C, clot; D, digestion; G, gas; M, microaerophilic; Nc, no change; O, oval; P, precipitation; R, round; S, subterminal; St, stormy; T, terminal; V and ( ), variable +, positive; –, negative; 1, spores rare; 2, fastidious; 3, non-ovolytic; 4, ovolytic 5, positive vanillin violet; 6, acrolein positive * Incomplete Data

Pathogenicity. The pathogenic strains of *Clostridium,* when grown in either of the two toxin-producing media, liberated a multiplicity of toxigenic substances into the supernatant fluid. The inoculation of the preformed toxin-complex together with the viable cells into the traumatized leg muscle of a guinea pig induced the typical lesion which was characteristic for each particular species. It was not found necessary to inoculate irritants, such as calcium chloride or sand, prior to performing the test. The preformed toxin damaged the traumatized tissues sufficiently to permit the organisms to initiate an active infection.

Inoculation of the nonpathogenic species in the same manner failed to produce any demonstrable lesion.

Production of Hydrogen. The use of hydrogen gas is the method of choice for producing the anaerobic condition necessary for the growth of clostridia in media lacking chemical reducing agents. The explosiveness of hydrogen gas presents a safety hazard in the laboratory, but this danger is substantially eliminated by the use of the generator apparatus shown in figure 1.[25] The attachment of a regulating valve prevents the formation of excessive pressure within the system, thus eliminating the possibility of a blow-out. This apparatus has been in use for a number of years without a single accident in a room where Bunsen burners are used simultaneously.

DISCUSSION

The routine isolation, separation, and classification of members of the genus *Clostridium* is of paramount importance in the hospital laboratory. Because of the difficulties involved in working with this group of organisms, however, many institutions have not undertaken the cultural studies of clostridia as a routine procedure. In those instances where members of this group are the causative agents of infection, lack of experience with the proper procedures necessary for their rapid identification is the cause of undue delay in the diagnosis. The series of tests outlined in this article should alleviate the problems involved in the classification of the clostridia. The system outlined in table 1 is by no means the only method which can be used for the classification of the genus *Clostridium*. This classification is applicable only when the media and methods outlined in this article are followed. It is of great importance to read the biochemical reactions after 48 hours. In the preparation of the media, any deviation from the formula given may cause an alteration in the specificity or intensity of the reactions. This in turn will negate the value of table 1 for the differential diagnosis of the clostridial species.

The application of this system has certain advantages which make it particularly suitable for the hospital laboratory. Media and reagents used are normal stock items and special equipment is kept to a minimum. Highly trained personnel are not necessary. The tests are simple and do not require complex manipulations. The results are well defined, eliminating the necessity for differential interpretation. The difficulties involved due to strain variation were taken into account and variable reactions were eliminated as key points in the classification.

The value of colonial morphology cannot be overlooked in the scheme of classification of the genus *Clostridium*. Classical descriptions of the various species are available.[13] A word of

warning, however, should be given on colonial variation. Dissociation is a common phenomenon in recently isolated strains, and several colonial phases of the same species may be observed on the same single plating medium. When more than one plating medium is used, the colonies of a given strain also appear in different morphologic forms on each medium. Thus, until the worker becomes completely familiar with the appearance of various morphologic forms on the medium routinely used, care must be exercised not to misinterpret these findings. Likewise, cellular morphology varies depending upon the source of the smear. Table 1 lists the usual shape and location of the spores within the cells. This does not imply, however, that every strain of a species on all media will show the same picture.

Serologic procedures for the identification of clostridia are based on two different criteria. The first is the serologic typing of bacterial somatic and flagella antigenic patterns.[26] The second consists of a typing based on the identification of the toxins produced by certain species.[27] Both methods are of extreme value in research. The present nonavailability of the required antisera limits the practical application of these procedures in the hospital laboratory. Due to the multiplicity of the antigenic fractions found within each species and the complexity of the toxin combinations, the local production of typing antisera is impractical. Where typing of subspecies is of importance, such as in *Clostridium botulinum* and *Cl. perfringens,* cultures should be forwarded to laboratories equipped for such work.

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THE DOCTOR AND THE PATIENT

The evolution of the doctor-patient relationship, as I have experienced it in the 40 years since I first began caring for patients, has been in the realms of the psychologic, the sociologic, and the economic. It will continue in such ways, I believe, until every person has access to medical care of the highest quality which existing medical knowledge affords, and when he can obtain it in a manner which itself imposes no hardship upon him. I hope we shall have the genius to achieve this end by voluntary effort, but we cannot do so unless we are willing to break new trails.

—J. H. MEANS
in *Bulletin of the New York Academy of Medicine,* p. 732, Sept. 1953

MILITARY MEDICO-DENTAL SYMPOSIUM

A symposium of unusual scope and interest has been scheduled for all personnel of the Armed Forces at the U. S. Naval Hospital, Philadelphia, Pa., 22 to 27 October 1956. The six-day program of medical and dental subjects will have as its theme topic "The Medical Aspects of Hemispherical Defense." In addition to the general sessions there will be sections on surgery, medicine, dentistry, nursing, psychiatry, the Medical Service Corps, aviation medicine, ophthalmology, and otolaryngology. Of special interest will be the opportunity to tour a hospital ship, a submarine, and the Naval Air Development Center at Johnsville.

Speakers and moderators of panel discussions will include Dr. Elmer Hess, Past President, American Medical Association; Major General Silas B. Hays, MC, USA, Surgeon General, U. S. Army; Major General I. S. Ravdin, MC, USAR, Professor of Surgery, University of Pennsylvania School of Medicine; Dr. Richard E. Shope, Member, Rockefeller Institute for Medical Research; Rear Admiral E. H. von Heimburg, USN, Commandant, Fourth Naval District; Dr. Stanley M. Levenson, Chief, Department of Surgical Metabolism, Walter Reed Army Institute of Research; and Brigadier General Harold G. Scheie, MC, USAR, Professor of Ophthalmology, University of Pennsylvania School of Medicine.

Programs, attendance applications, and additional information may be obtained by addressing the District Medical Officer, Building No. 4, U. S. Naval Base, Philadelphia 12, Pa. Arrangements have been made to award retirement point credits for Army, Air Force, and Naval Reserve officers in attendance.

Errata: In the September 1956 issue (pages 1384-1385) an error was made in the listing of the following named officers; they were promoted to the permanent grade of Captain, USAF, in the Corps indicated:

EGGETT, Earl H. (MSC)
McINTOSH, Billy B. (MSC)
PLOCK, William L. (MSC)
RADER, Marjorie A. (MSpC)
DUNNUM, Delores I. (NC)
DUPLEASE, Margaret L. (NC)
VSETULA, Josephine M. (NC)
WORKMAN, Betty J. (NC)

ENDEMIC Q FEVER IN SOUTH TEXAS

PHILIP J. SNODGRASS, *Lieutenant, MC, USNR*

FROM July 1954 to December 1955, 53 patients with a diagnosis of primary atypical pneumonia were admitted to this dispensary. Attempts to establish a specific serologic diagnosis proved fruitless until September 1955 when two patients' sera showed, during the acute illness, a diagnostic rise in complement fixation titer to *Coxiella burnetti (Rickettsia burneti)*. A survey of convalescent patients who were still at this command, dating back 17 months, yielded 12 of 19 with positive titers of 1:10 or greater to Q fever antigen. One of two further acute cases studied also showed a rising titer. Using these 15 patients with proven cases as models, 18 additional patients, who were lost to serologic follow-up, were selected for their similar clinical, laboratory, roentgenographic, and epidemiologic findings. These 33 cases, all personally observed by the author, are presented to exemplify endemic Q fever as it occurs in south Texas.

CLINICAL FEATURES

Signs and Symptoms. In agreement with the literature,[1-4] the onset was acute, with constitutional symptoms of fever, chills, headache, and myalgia predominating over respiratory symptoms of chest pain and cough. The patients sought medical attention early—on the average, two days after onset. Headache was severe, paralleling the degree of fever, but it was not the preeminent complaint as noted in Derrick's[1] original cases, nor was it associated in our series with retro-orbital pain, photophobia, and lacrimation, as has been stressed.[4-6] Influenzalike muscle, bone, and backaches were usually described. Chest symptoms were volunteered only occasionally by the patient; when sought for, a pleuritic pain or feeling of tightness or aching and dry, mild cough were elicited in a third of the patients. More than half described a prodrome of feeling vaguely unwell for a day prior to the onset of fever. Stiff neck, actually a part of the myalgia, was volunteered chiefly during the poliomyelitis season. No rash, icterus, arthritis, epididymitis, or conjunctivitis were noted in our series. The frequency of the various symptoms is recorded in table 1 and compared with that in 180

From U. S. Naval Auxiliary Air Station, Kingsville, Tex. Dr. Snodgrass is now at 119 Maple St., Belmont, Mass.

cases of endemic Q fever in California.[2] This report also mentioned generalized weakness in 86 per cent of cases, anorexia in 43 per cent, sore throat in 5 per cent, and retrobulbar pain in 13 per cent.

TABLE 1. *Frequency of various signs and symptoms on admission in 33 patients with Q fever*

Signs and symptoms	Number of cases	Per cent of total	Per cent of 180 cases, Calif.[2]
Fever	26	79	100
Malaise	18	55	100
Myalgia	18	55	47
Headache	15	46	65
Chills	13	40	74
Chest pain	12	36	10
Cough	10	30	24
Nausea, vomiting	5	15	13
Stiff neck	3	9	0

Fever was noted in all but five patients on admission. In the 15 patients with a proven diagnosis this averaged 102.4°F; in those with the clinical picture, 102°F. The pulse on admission correspondingly averaged 90 and 86 per minute, with means of 84 and 86, and was rarely elevated above 100 per minute even at the height of the fever. The average rise was 7 beats per degree of fever, as noted in Robbins'[13] patients in Allied troops in Italy in 1945.

On admission, physical signs of pneumonia were found in 6 of the 15 proven cases; examination in 5 was negative throughout, and 4 later developed signs on the ward. Results of examination in patients with the similar clinical disease were positive in 9, negative in 4, and delayed positive in 5. Since all showed clear-cut lesions roentgenographically, this paucity of physical signs as a group was consistent with primary atypical pneumonia.[7,8] When present, the chest signs were usually fine, crepitant rales brought out by extremes of respiration and after cough, and bearing an anatomic, not opposite[2] relationship to the lesions seen roentgenographically. If wheezes or coarse rhonchi were heard, such a patient usually proved to be negative for Q fever antibodies. No picture unique for Q fever could be drawn from the signs and symptoms alone, however.

Seasonal Incidence. Figure 1 reveals the striking incidence in the months from July through December. All patients stated that they had been in the immediate vicinity prior to and during the 21-day incubation period.

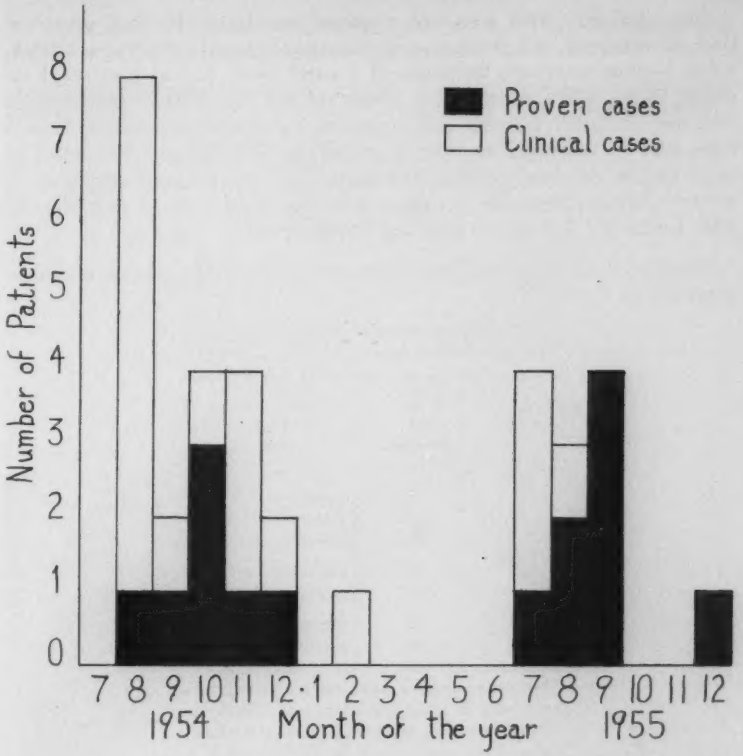

Figure 1. Seasonal variation of Q-fever cases.

Laboratory Findings. The routine blood studies helped considerably to delineate the Q fever patients. White blood cell counts in the proven cases averaged on admission 10,000/μl, with a similar mean and a range of 5,700 to 13,000/μl. The clinical cases had an average of 9,600, a mean of 9,400, and a range of 5,200 to 13,000/μl. Differential white blood cell counts on the average revealed 67 per cent segmented polymorphonuclears, 6 per cent bands, and 25 per cent lymphocytes. An occasional to as many as 8 per cent of the lymphocytes were noted to be atypical, identical with those seen in infectious mononucleosis. The erythrocyte sedimentation rate (Cutler method) on admission averaged 16 mm per hour in both groups. The reported pattern of a rising white blood cell count and falling sedimentation rate over the first 21 days of Q fever[9] could not be confirmed due to inadequate follow-ups. Cold agglutinins, on admission and in two to three weeks, were negative in all 33 patients. Urinalysis in acute cases was unremarkable, and albuminuria was not noted as in Derrick's cases.

One patient, who was not studied serologically but who had typical clinical, laboratory, and roentgenographic findings, underwent lumbar puncture because of a stiff neck and a positive Kernig's sign. This revealed a clear spinal fluid at a pressure of 190 mm of fluid, a total cell count of 1 polymorphonuclear leukocyte and 6 lymphocytes, and a protein of 125 mg per 100 ml. The only other patient in the literature with meningeal signs in Q fever[10] had *C. burnetti* cultured from the spinal fluid and showed 243 cells/μl, 70 per cent being lymphocytes.

Serologic studies on three patients with acute cases are summarized in table 2.

TABLE 2. *Complement-fixation titers to* C. burnetti *in three Q fever patients**

Patient	Day of disease	Complement fixation titer
1	7	negative 1:5
	18	positive 1:40
	60	positive 1:40
2	17	positive 1:10
	55	positive 1:160
3	4	positive 1:10
	36	positive 1:320

*Serologic studies were carried out by the Department of Virus and Rickettsial Diseases, Walter Reed Army Institute of Research, Washington, D. C.

Studies on 11 patients were positive in titers of 1:320 to 1:10 from 5 to 17 months after onset of the disease. Additional studies on those with acute cases and at random on the others were all negative for cold and streptococcus MG agglutinins, psittacosis group antibodies, influenza hemagglutinins, and the RI virus[11] group antibodies.

Roentgenographic Findings. Despite the fact that in one reported series of patients with proven Q fever[3] 69 of 89 random chest films were normal, all patients here showed clear-cut pulmonary lesions on roentgenographic examination. Since the distribution was not lobar or segmental, the lesions were grouped by dividing the lung fields into zones by three equidistant horizontal lines, as reported in Q fever by Feinstein, Yesner, and Marks.[9] This study of the epidemic in troops returning from Italy in 1945 showed a predominance of lower zone distribution, *i. e.*, upper third, 10 per cent; middle third, 40 per cent; and lower third, 50 per cent. The present series is quite similar—upper zone, 18 per cent; middle zone, 36 per cent; and lower zone, 46 per cent—evenly divided between the two lungs. Figure 2 shows one type

of pulmonary finding—the pleuritic type. Thickened pleural shadows and prominent fissures are seen.

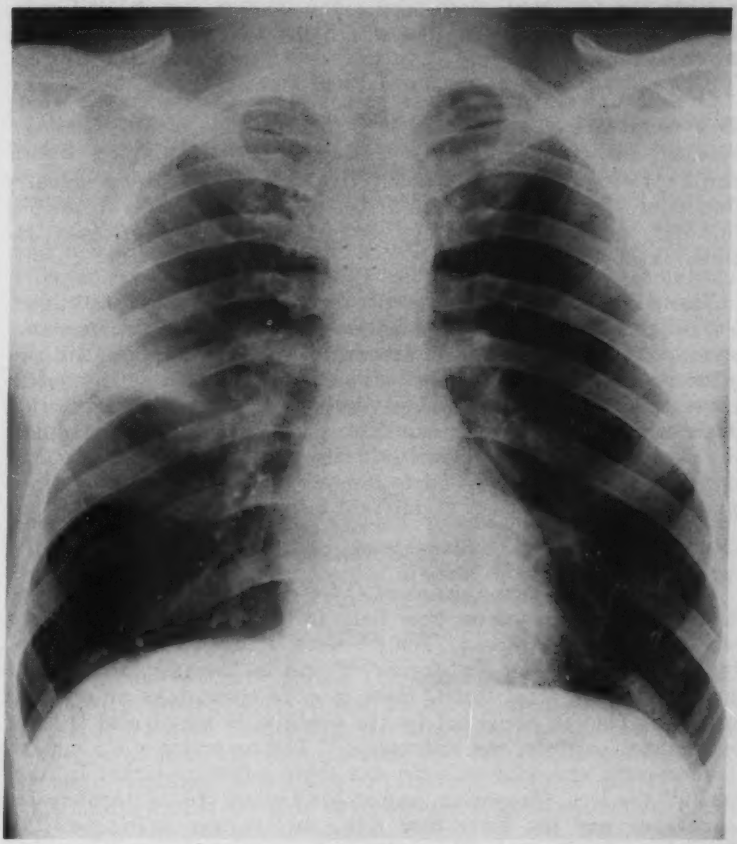

Figure 2. Roentgenogram showing pleuritic type of pulmonary finding in Q fever; thickened pleural shadows and prominent fissures are here combined as usual with alveolar type. The middle-lobe fissure thickening was present one year later.

One patient presented what is felt to be a rare complication of Q fever: spontaneous pneumothorax. He entered the hospital with acute fever, chills, and malaise, and on the second day showed a large left upper lobe peribronchitic type of lesion, but a white blood cell count of 12,700/μl, normal differential, and sedimentation rate of 22 mm per hour. On chlortetracycline hydrochloride (aureomycin) the temperature slowly returned to normal and he was discharged on the 13th day, with minimal roentgenographic findings remaining. He returned the next day with a 20 per cent collapse of his left upper lobe, and after ex-

tensive investigation at St. Albans Naval Hospital he was discharged with the impression that this was not secondary to tuberculosis but to the atypical pneumonia. Though not studied serologically, this patient's picture is quite consistent with that in those with proven Q fever.

Clinical Course. All but one patient were febrile on the ward, their temperatures usually spiking to from 103° to 105°F in the evening, responding poorly to salicylates, and returning toward normal by morning. After about five days the patients usually felt clinically well and were afebrile; they were able to resume full duty in about seven days without significant weakness, fatigue, or depression.[3]

Treatment. In the treatment of Q fever, Clark, Lennette, and Meiklejohn[12] demonstrated a significant difference between aureomycin, effective against *C. burnetti* in vitro, and penicillin, ineffective as a control. The temperature returned to normal in three days on the tetracycline derivative, compared with eight days on the average with penicillin. Five patients here on aspirin or penicillin became afebrile in an average of 4.2 days. The duration of fever in 25 patients treated with various tetracyclines averaged 3.6 days, a not significant difference.

DISCUSSION

The original reported cases of Q fever in Australia,[1] and those in returning U. S. troops from Italy in 1945[9,13] and in stockyard workers in San Antonio, Tex.,[14] were epidemic in occurrence. Since the studies in California[2,15] and in Texas,[16] however, it has become apparent that Q fever is more common as an endemic disease. This is borne out by the world-wide surveys of Q fever in humans, animals, and arthropods.[17] The reservoir of *C. burnetti* is domestic and wild animals and their infesting ticks. In Australia[18] the tick, *Boophilus,* and in the United States *Dermacentor andersoni* and the Lone Star tick, *Amblyomma americanum,*[4,19] have been implicated. The method of spread to humans is rarely by tick bite, as in Rocky Mountain spotted fever. A brilliant series of investigations in California[15,20] established that the disease is air-borne, contracted by inhalation of dust contaminated by dried tick feces or animal excreta. Such infection is more common in dry, dusty seasons. Rickettsiae can be isolated from floor dust in dairy barns or from animal hides. Less commonly the organism is shed from the infected lacteal ducts of dairy cattle.[21] Raw milk or milk pasteurized by methods other than the high temperature-short time method can spread the disease, since *C. burnetti* is fairly resistant to heat.[22]

This air station is surrounded by semiarid beef and dairy cattle country. The seasonal incidence corresponds to the active, multiplying stages of cattle ticks, and the months from June to Novem-

ber have many dust storms. Local physicians report that the Texas Department of Health found evidence of Q fever in this area in humans, cattle, and raw milk in 1948. Therefore it is apparent that military establishments in south Texas are in an endemic Q fever area. Considering the many subclinical or undiagnosed cases, the true incidence must be considerable.

Diagnosis by complement fixation studies is time-consuming and difficult; this may explain the few cases of Q fever reported in Texas in the past five years. Experience in Europe with intradermal Q fever antigen[23, 24] has shown that a delayed type reaction can be elicited on the third to eighth day of the disease, and remains positive up to four years. The agreement with complement fixation test is only 76 per cent. The skin test unfortunately renders the complement fixation test positive at low dilutions. For diagnosis where laboratory facilities are limited and for epidemiologic surveys, such an antigen would be of great value in this country. In a self-limited disease in which mortality is slight, solving the problem by eliminating ticks from domestic and wild animals over a large area seems impractical, particularly since it can be treated effectively.

In conclusion, it is felt that the signs and symptoms here described, though common to atypical pneumonias, when combined with the distinctive routine blood studies and roentgenographic findings allow one to make the diagnosis of Q fever with accuracy in an area where the disease is endemic.

SUMMARY

During an 18-month period (1954-1955) 15 patients with serologically proven Q fever and 18 otherwise identical patients with Q fever were admitted to the dispensary at this air station. A review of their signs, symptoms, and laboratory and roentgenographic findings reveals a distinctive clinical picture. The epidemiology of Q fever is reviewed in light of recent advances reported in the literature.

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A patient comes to see you. *When you believe that an assistant can do your job as well, you are on the way out.*

—Martin T. Fischer

A PSYCHIATRIC SERVICE AS A THERAPEUTIC COMMUNITY

II. Ten-Month Study in the Care of 939 Patients

HARRY A. WILMER, *Commander, MC, USNR*

THE CORE of the concept of the therapeutic community in psychiatric management is the deep conviction that everyone, patients and staff, is part of the community in which the total effort all of the time should be devoted to the treatment of patients. By "treatment" is meant not only conventional therapy, often limited to therapeutic interviews or administration of drugs, but the total milieu of which the staff constitute elements equally important to that of the psychiatrist. It is a family unit not unlike a ship's company; in this, however, the hierarchy of command serves the primary function of helping the crew to understand their conflicting feelings, statements, and attitudes.

In a sense, the therapeutic community here described may be thought of as a brief "corrective" emotional experience directed to problems of socialization and acculturation. To this end, it was felt essential that each nurse and corpsman share with the physician a general knowledge of the patients' difficulties, particularly those influencing their socialization difficulties in the service and on the ward. By a process of sharing (though not sharing confidences of a high order of importance), staff interest was focused upon the reality of the present, the here and now, and the ego problems of the patients. For this purpose, the receiving ward of the psychiatric service at this hospital was conducted as a therapeutic community[1] for a period of 10 months, during which time 939 patients passed through the ward, remaining for an average stay of 10 days.

While the more unconscious or subtle meanings of delusional material in the schizophrenic patient were of undoubted importance, the emphasis was for the most part upon the reality misinterpretation, the inconsistencies, the faulty logic, and the metacommunication. Cognizance of the psychoanalytic implications and interpretations notwithstanding, these were not brought to the patients' awareness in the ward culture except under unusual circumstances. There was no effort to meet all patients' needs,

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and many, in fact, were consciously—and it was thought, therapeutically—frustrated. Above all, effort was bent toward preventing at all cost the fragmentation of staff or patients, the splintering and disruptive or destructive subgroup formation. Theoretically, the ingroup comprised the entire ward, varying in number from 12 to 34 patients. The staff ingroup was composed of all corpsmen and nurses, and the social worker, psychologist, and psychiatrist.

By the device of daily group meetings, immediately after ward rounds and lasting for 45 minutes at the beginning of each day, it was felt that a "tone" or "atmosphere" was fostered which could reasonably be expected to carry through for the entire day. This patient-group meeting, ritualistically preceded by the formal military sick call and followed by a more informal group or ward meeting, emphasized in a dramatic but subtle manner the dual role of the ward medical officer, both officer and doctor, administrator and therapist. There was no attempt to separate these two functions except in time and by nonverbal communication. At sick call the doctor was saying "I am a Navy Medical Officer"; when he sat quietly and comfortably waiting for the group to assemble or to talk he was saying not only "I am now physician" but also "You can think of me now, if you wish, as nonofficer."

This communication was, needless to say, tested at once by the more verbal, or the more mobile, patients. If they found that previously repressed or "dangerous" thoughts and words evoked neither condemnation nor punishment, they might test further or they might accept what they wished to believe, namely, "Things are as they seem, I am safe." But when doubts still crept in these were commonly dealt with not in the patient-doctor constellation, but in the community constellation—*i. e.*, doctor, staff, patient group; and for the most part, the therapeutic reinforcement came from the other patients, verbally or nonverbally. They behaved *as if* what the testing patient wanted to believe were true. This was the ward culture, and came about through hard and intensive work.

Immediately after the ward meeting, the staff analyzed and discussed the ward behavior, the individual patients, and the group. These meetings began with a chart being drawn on the blackboard indicating where everyone had sat, hence there was visual presentation of both patients and staff together as a group at the ward meeting.

The long-term evaluation of the "effectiveness" of this ward culture and therapy upon the schizophrenic, neurotic, or character disorder patients is beyond the scope of this investigation. What was carefully studied and documented was the speed with which patients became acculturated to a hospital and accepted themselves as patients—particularly the painful reality of being

"mental" patients; the signs of group cohesiveness or lack of cohesiveness; the effect of the ward on the psychotic symptoms, particularly delusions and hallucinations; how the patients' need for nightly sedation decreased, and how their assaultive behavior largely ceased.

By the process of daily group meetings (at first Monday through Friday, but later continued through Saturday) there was a continual "confrontation" of staff by patient, patient by staff, and staff by staff, as well as of patient by patient. The mere sitting down together with all the outward manifestations of socially acceptable behavior was considered of importance, the regarding of one another for 45 minutes and the comfort of silence being unusual and salutary social therapeutic experiences. There was continual attention to, but no open criticism of, objectional social behavior; for example, the unacceptability of scattering cigarette ashes on the floor was demonstrated by a staff member quietly handing a patient an ash tray. This clue was picked up by patients, who treated each other as the staff had done. Patients were encouraged to sit down, because that is what is done in meetings, though it was not insisted upon. They were expected to attend meetings, and with a few exceptions complied after persistent persuasion on the part of the staff. If they did not, it was expected that a staff member would try to return a wandering patient to the group, and if this failed, the doctor would try to bring the patient back, suggesting as he left that the group carry on without him, which it invariably did. Corpsmen and nurses were encouraged to talk in the meetings, though their participation was variable. The staff was encouraged to sit dispersed throughout the group but the patients were allowed to sit where they chose.

Patients were told that "we" did not use the "quiet" or seclusion room on this ward. Of the 939 patients, totally unselected, a great many had been brought in in restraints; others had been kept in seclusion rooms for days, weeks, or a month during their previous hospitalization. They were all treated as though restraint were not necessary, and it was indicated to them that they were expected to control themselves and maintain a degree of emotional order. Moreover, they were not given sleeping pills except in emergencies.

This being a military hospital, the exceptions to the above must be considered because during the night the psychiatric Officer of the Day had responsibility for the care and treatment of the psychiatric service, both the receiving ward and the remaining psychiatric service, which at the end of the 10-month period had a census of about 250 patients. During the night on five occasions, officers of the day placed a patient in a seclusion room on the receiving ward. They also ordered sleeping pills occasionally when requested.

Tranquilizing drugs, used sparingly in the first four months of the study, were used more frequently in the last six. At first, it was felt necessary to find out if the social environment, the culture, and the essential community feeling would of themselves be strong enough forces to influence human behavior in a highly therapeutic manner. When this was confirmed to our satisfaction, the question then to be answered was: Could the forces be enhanced by use of the new drugs? Our impression was that they definitely could be, particularly with the hyperactive, aggressive patient.

In the five months preceding the operation of the therapeutic community, 540 patients were admitted and received 328 sleeping pills and 58 injections of barbiturates. In the last five-month period of the therapeutic community, 543 patients were admitted and received 23 sleeping pills, 20 of these ordered by the Officer of the Day. Nineteen parenteral injections of barbiturates were given, 17 of them by the Officer of the Day.

It was felt that abolishing all forms of physical restraint and not using the seclusion room were of signal importance. It was not that under unusual circumstances we might not have had recourse to restraint or seclusion room, nor that this would in any way have disproved the basic concept of the therapeutic community, but that these methods were not necessary. Yet an exception might still require their use under unusual circumstances. The lack of the necessity of using quiet rooms or restraints is a commentary on the self-restraint and quiet functioning of the ward staff as wall as the patients. On only one occasion was it necessary to give electric shock treatment on the receiving ward. For the most part, patients conducted themselves in a serious, friendly, occasionally humorous fashion. The ward was rarely so disturbed that it looked like a "mental hospital." It looked like any medical or surgical ward, except that the doors were locked.

Although patients remaining on the ward for only 10 days created a rapidly changing group the culture was surprisingly stable. Perhaps because of the kaleidoscopic nature of this busy ward, the relative permanency of the staff was of great importance and reassurance to the patients. This was clearly an advantage over those wards on which patients remain through numerous staff changes. Similarly, it was felt that the military service was indeed a favorable climate for the therapeutic community. The intercurrent staff changes which did occur were not of great significance to the patients, for the charge nurse, the ward medical officer, the social worker, and the psychologist remained throughout the entire study period, except for brief periods of a few days.

More detailed studies are in progress on the nature of this experience and will be published at a later date.

SUMMARY

This is a preliminary report made at the conclusion of a therapeutic community study on the psychiatric receiving ward at this hospital.

The staff of the ward found it unnecessary to place any patients in quiet or seclusion rooms, though five patients were placed in seclusion rooms during the evening by officers of the day. All were removed to the ward in the morning. No patient had to be removed from the ward because he was too sick to function in the therapeutic community. A total of 939 patients passed through this ward over a period of 10 months. Ward meetings were held daily Monday through Saturday and were followed by daily staff meetings. Meetings were held once a week with corpsmen and once a week with nurses. Both patients and staff had access to the ward medical officer if they desired individual interviews.

The use of sleeping pills diminished to a negligible amount, and parenteral sedation was rarely used. Tranquilizing drugs were used for aggressive and disturbed psychotic patients, particularly in the last six months of the study.

A spirit of trust between patients and staff was clearly manifest. There was also confidence in the belief that both staff and patients, separately or together, preferred to work and live together in self-control rather than in its absence.

ACKNOWLEDGMENT: This experiment was started while Rear Admiral D. C. Gaede, MC, USN (Ret.), was Chief of the Neuropsychiatric Service, and was carried out with his help and co-operation. It was continued with the co-operation of the next Chief of Service, Capt. Marion Roudebush, MC, USN.

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The popular concept of a strengthening diet is a chicken wrung out in hot water.—Martin T. Fischer

RESULTS OF UNCLASSIFIED FEDERAL RESEARCH NOW AVAILABLE

The National Science Foundation has announced that the reports on results of government-sponsored scientific research of an unclassified nature will henceforth be made more widely available to scientists everywhere. Specifically, the program, designated Government Research Information, is designed to assist any research scientist to:

1. Learn what unclassified scientific reports on government research are being issued in his field of interest. This information is available by addressing the Government Research Information Clearinghouse, National Science Foundation, Washington 25, D. C., Attention of Dwight E. Gray.

2. Obtain, on a subscription basis, a report-announcement service that will keep him informed regarding the bulk of such reports and through which he can purchase copies of listed reports. Information on this service may be obtained from the Office of Technical Services, Department of Commerce, Washington 25, D. C., Attention of John C. Green.

3. Obtain access to a well-catalogued reference collection of these reports which he can consult much as he now consults books in a reference library. Complete information on this service, including photo-reproduced forms, can be obtained from the Science Division, Library of Congress, Washington 25, D. C., Attention of John Sherrod.

HIGH-SPEED ROTARY SURGICAL GRINDING OF THE SKIN

EDGAR D. GRADY, *Lieutenant Commander, MC, USNR*

EXCELLENT cosmetic improvement of certain skin blemishes has been accomplished by grinding with a wire brush or steel bur driven by a high-speed rotary electric motor. I have found that a motor of which several types are available in hardware stores and hobby shops (fig. 1), with a speed of 25,000 to 30,000 rpm and having an attached wire brush 2 cm in diameter and 2 mm in thickness (fig. 2), is satisfactory for skin planing the following defects: (1) acne scars of the face, (2) accidental traumatic tattoos, (3) art tattoos, (4) surgical and traumatic scars, (5) keloids, and (6) seborrheic verrucae. A steel bur attachment to the same motor has proved effective in removing plantar warts and verrucae of the fingers. The safest and most satisfactory method of anesthesia for these operations is local infiltration with procaine hydrochloride containing a vasoconstrictor.

The use of motor-powered rotary steel burs to produce abrasion for the removal of pitted acne scars and tattoos was first reported in 1905 by Kromayer.[1] In 1935 Janson[2] described the removal of tattoos by hand-powered wire brush. High-speed (30,000 rpm) rotary abrasion apparatus with a protective sleeve was reported to give excellent results in skin planing by Schreus[3] in 1949. In 1953 Kurtin[4] received much attention for his report of dermal abrasion with a wire brush driven by a 12,000-rpm motor. Eller[5] at first used sandpaper for dermal abrasion, and later reported his results, with ethyl chloride anesthesia, using a 12,000-rpm motor turning a wire brush. Later experience with a 30,000-rpm motor proved more satisfactory in Eller's[6] hands and was as easily performed on flaccid, anesthetized skin as on frozen skin. Buncke[7] stressed the advantages of local infiltration anesthesia over ethyl chloride. Iverson[8] reported an additional use for dermal abrasion. He found that abrasion of the edges of facial wounds prior to suture gave a nearly invisible healing line. The dangers of sandpaper abrasion have been emphasized by the reports of silica granulomata made by Buley and Kulwin[9] and Epstein.[10]

From South Stratford Road at First Street, Winston-Salem, N. C.

Figure 1. One form of a motor which may be used for skin planing. (Photograph by courtesy of the Dremel Manufacturing Co.)

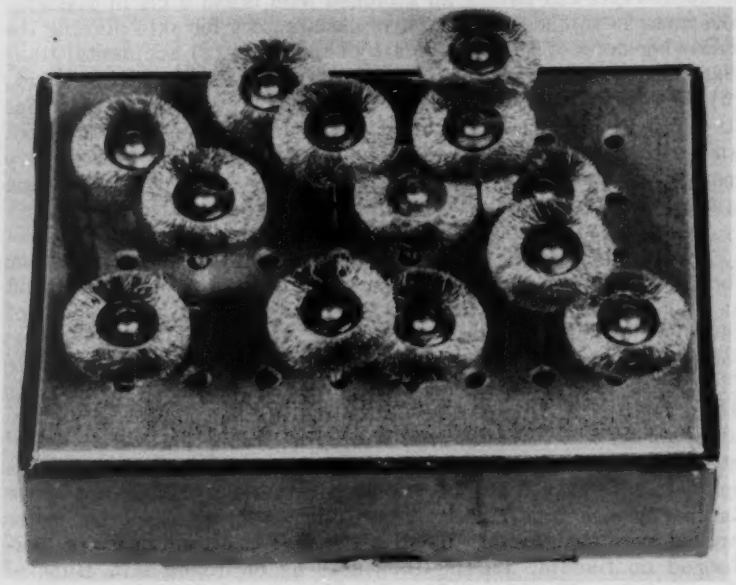

Figure 2. Spare wire brushes made of stainless steel, measuring 2.0 cm in diameter and 0.2 cm in thickness. It was found advisable to put strengthening shims to within 0.2 cm of the periphery when motors with slower speeds were used. With higher speed motors, this has not been necessary.

The psychic benefit obtained by improvement of appearance has been tremendous. Self-consciousness caused by unsightly acne scars is lost, once the scars are removed by surgical

planing. Removal of embarrassing tattoos (figs. 3 through 5) gave the patients a new self-confidence, particularly in family relationships. For example, the family of a 19-year-old man refused to let him come home until he had a tattoo removed. Another man had a tattoo on his abdomen, which his wife insisted be removed.

Figure 3. Tattoo before planing. Figure 4. Same tattoo four days after planing.

A warrant officer who had numerous tattoos over all extremities and trunk was only embarrassed by those on his fingers, which were the only ones visible when he was fully dressed. Another example was a 35-year-old man who had carried dark foreign-body blemishes over the bridge of his nose since a traumatic gravel brush injury many years earlier (figs. 6 and 7). An elderly man had an unattractive seborrheic verruca of his forehead, easily eradicated by planing (figs. 8 and 9). One sailor was especially happy to see his fiancee after he had obtained a smooth complexion where once he had had acne scars.

Warts on the fingers are painlessly and most efficiently removed by high-speed grinding with a steel bur. I have found this method to be the least disabling and to result in the quickest healing. The same applies to the treatment of plantar warts. There is no eschar (as is present with coagulating or dessicating methods) to mar the visibility in this method of treating warts. By

Figure 5. A tattoo 10 days after planing. Further improvement continued for the next 6 weeks.

examining the bed at the site of grinding with a magnifying glass, one can remove the last remnants of the white glistening wart, as suggested by Prazak and Thomas[11] in their curettement method. Minimal surrounding tissue is removed, and there is very slight disability. In fact, with a soft padded dressing on the foot, the patient usually experiences less discomfort in walking after the procedure than he did before it.

All the above-mentioned procedures are done on an outpatient basis. Dressings are applied and the patient returns to work on the following day, or even on the same day if he wishes.

After trying various methods of anesthesia, I have found that local infiltration with procaine containing a vasoconstrictor (2 per cent procaine hydrochloride containing 10 drops of epinephrine 1:1000 per ounce) is best. The use of a sponge soaked in saline solution containing a vasoconstrictor (0.5 ml of epinephrine in 4 ounces of saline) to sponge away the slight accumulation of oozing blood during the planing, further improves hemostasis and visibility. Ethyl chloride freezing can be condemned for several

reasons: (a) The period of anesthesia is fleeting, limiting the care with which planing can be accomplished. (b) The frost of ethyl chloride disguises the lesion to be planed. (c) In the last few seconds of anesthesia with ethyl chloride, the skin becomes flaccid, the hemostatic effect is lost, and the revolving brush

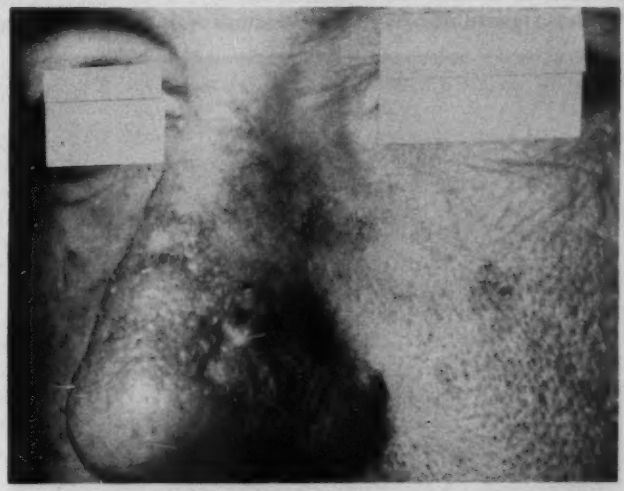

Figure 6. Accidental foreign-body tattoo and scarring of nose and cheek.

Figure 7. After planing accidental foreign-body tattoo of nose and cheek.

sprays blood and epithelial debris in spite of a brush shield. (d) Ethyl chloride is a potent general anesthetic and as such has largely been abandoned because of numerous fatalities—usually cardiac arrest.[12,13] Although the blower used with this technic disperses the vapor, it is not uncommon for the patient to become very excited or to lose consciousness. (e) Ethyl chloride is explosive and flammable. (f) A well-trained assistant is indispen-

Figure 8. Seborrheic verruca before planing.

Figure 9. Seborrheic verruca after planing.

sable[14] when using ethyl chloride, whereas the grinding done under local infiltration anesthesia requires no assistant. Freon[15,16] has been recommended as a substitute for ethyl chloride, but while it is not explosive, other disadvantages are still inherent in the freezing method. By use of motors of 25,000 rpm and up, instead of the 12,000 rpm recommended by Kurtin[4] and others,[1,3] it has been found that there is no advantage in having rigid skin.

Depth of planing is controlled by careful observation, using judgment gained with experience. The depth is comparable to that used in taking split thickness skin grafts, and the appearance after planing resembles a fresh donor site. In planing tattoos, it is sometimes difficult to eradicate every vestige of pigment, and at times it may be best to leave a few pigment dots behind in order not to produce excessive scarring. The regrowth of hair may disguise the residuals of a few pigment dots. The depth of pigment in the skin is variable, depending on the way it was placed by the tattoo artist, on the type of skin, and on the age of the tattoo. It generally has been found that the older the tattoo, the deeper it is, but the majority of tattoos can be completely removed with no residual and with minimal scarring. Antibiotic dressings with hydrocortisone seem to minimize scar formation.

Planing for acne scars is much simpler, provided the disease process is quiescent. There is little danger of going too deep, and almost no scarring as a result of the planing itself. If infected or sebaceous cystic lesions are present, five-minute scrubs twice daily with a soap containing hexachlorophene are used for two or three weeks preoperatively. Residual cysts are marsupialized by planing and their vertical walls smoothed away to make the bottom of the cyst nearly level with the surrounding skin. This is the only way some areas of chronic cystic acne may be cleared up, especially when located around the ears and neck.

The raw areas are dressed with an antibiotic ointment and fine mesh gauze. Bacitracin ointment has been satisfactory in most cases. Recently, oxytetracycline and hydrocortisone ointment has been used with equally good results. It seems to be more effective in keloid formers. Epithelization and healing is usually complete in from 10 to 14 days. There remains some temporary hyperemia, but color has satisfactorily returned toward normal within 2 to 3 months.

SUMMARY

High-speed (25,000 to 30,000 rpm) motor-driven wire brush surgical planing offers a satisfactory method of improving acne scars of the face, accidental traumatic tattoos, art tattoos, surgical and traumatic scars, keloids, and seborrheic verrucae. A steel bur attachment to the same motor has proved effective in

removing plantar warts and verrucae of the fingers. Anesthesia is best accomplished by means of local infiltration with procaine hydrochloride containing a vasoconstrictor.

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ACUTE ADRENAL INSUFFICIENCY

"Acute adrenal insufficiency . . . can appear as sudden circulatory collapse, decrease in blood pressure, increase in pulse rate, or perhaps an elevation of temperature, and may cause the patient to lose consciousness quickly. In these circumstances the serum electrolytes may be normal, whilst most of the features of chronic adrenal insufficiency will be absent."

—A. G. BECKETT, B. M., M. R. C. P.
C. J. STEVENSON, M. D., M. R. C. P.
in the *British Medical Journal*
p. 27, July 1956

Clinicopathologic Conference

Tokyo Army Hospital, APO 500, San Francisco, Calif.*
406th Medical General Laboratory, APO 500, San Francisco, Calif.**

COUGH, DYSPNEA, AND ABDOMINAL PAIN

Summary of Clinical History. A 21-year-old white male Army private was admitted initially to a hospital in Korea on 15 December 1954. He was transferred from there to this hospital four days later with a history of cough and shortness of breath of two months' duration. One month prior to admission he had experienced onset of pain in the epigastrium in the region of the xiphoid process. The shortness of breath had progressively increased and the cough was productive of mucoid sputum. There was no history of hemoptysis or edema and at no time had there been chest pain or radiation of pain to either arm or to the neck. There was no history of rheumatic fever or known contact with tuberculosis.

There was no nausea, vomiting, or diarrhea, and bowel movements were normal. There was no dysuria, polyuria, or hematuria.

Physical Examination. Physical examination revealed a well-developed, well-nourished white male, who looked his stated age. His height was 6 feet 1 inch; his weight, 170 lbs; temperature, 98.6°F; pulse, 98 per minute; and respirations, 20 per minute. On admission the blood pressure was 105/80 mm Hg. There was no paradoxical pulse. The pupils were equal and reacted to light. There were petechiae in both palpebral conjunctivae. The throat and neck were normal. The lungs were resonant and clear. Exam-

*Col. Charles L. Kirkpatrick, MC, USA, then Commanding Officer. From the Department of Medicine, Lt. Col. William G. Dunnington, MC, USA, then Chief.
**Col. Joe M. Blumberg, MC, USA, Commanding Officer.

ination of the heart showed the apex beat to be in the sixth intercostal space at the midclavicular line; however, the area of cardiac dullness extended to the anterior axillary line in the sixth interspace. At the apex there was a continuous high-pitched rub with a musical sound in the systolic component. The first sound at the mitral area was accentuated. Examination of the abdomen revealed no palpable organs or masses. The genitalia were normal. There was no peripheral edema.

Laboratory Studies. Examination of the blood on admission revealed the hemoglobin to be 16.5 g/100 ml; there were 16,350 white blood cells per μl, with 51 per cent neutrophils, 20 per cent lymphocytes, 3 per cent monocytes, and 26 per cent eosinophils. Bleeding time was 1 minute; coagulation time, 9 minutes; and platelet count, 228,000 per μl. The sedimentation rate was 18 mm per hour (corrected), and the hematocrit was 50 per cent. The cardiolipin microflocculation test was negative. The urinalysis was negative. The pericardial fluid smear showed a few neutrophils and lymphocytes. No bacteria were seen. Culture of the fluid showed no growth in 48 hours. Smear and concentrate were negative for acid-fast bacilli. Peripheral L.E. cell preparation was negative. The sputum was negative for acid-fast bacilli by smear and concentrate on four occasions. The sputum was also negative for parasites. Complete blood cell count on 13 January 1955 showed hemoglobin to be 13.2 g/100 ml; there were 12,700 white blood cells/μl, with 48 per cent neutrophils, 9 per cent lymphocytes, 40 per cent eosinophils, and 3 per cent basophils. Platelet count on 15 January was 190,000/μl. The serum calcium on 17 January was 13.5 mg/100 ml. The urinalysis showed a slight trace of albumin on 12 January but was otherwise normal. The specific gravity at that time was 1.026, and the urea nitrogen was 19.8 mg/100 ml. The serum protein on 13 January was 6.1 g/100 ml, with an albumin-globulin ratio of 2.8/3.3. PPD tuberculin tests, first and second strength, were negative.

Course in Hospital. When the patient was admitted to this hospital he presented the classical findings of pericardial effusion. Pericardial tap was done on 21 December 1954 and 325 ml of serosanguineous fluid were obtained. Culture of this was negative. Cell studies on the fluid for malignant cells were also negative. After the pericardial tap the shortness of breath improved. A thoracentesis was done on 30 December and 140 ml of straw-colored fluid were obtained. Subsequently a pericardial tap was done and 180 ml of serosanguineous fluid were withdrawn. The fluid again was negative for malignant cells. Two electrocardiograms were done. On 9 January 1955 the patient complained of epigastric pain. Examination of the chest at this time was normal and appointments were made for a gastro-intes-

tinal series. On 10 January he coughed up gross blood mixed with mucoid sputum. Examination of the chest at this time revealed crepitant rales throughout. The patient was digitalized with no clinical improvement. On 10 January the patient's temperature was 101°F. At this time streptomycin sulfate, 1 gram daily, and INH (brand of isoniazid), 300 mg daily, were started. The patient failed to improve. He became increasingly short of breath and continued to cough up large amounts of mucoid sputum mixed with blood. Because of progressive anemia, two blood transfusions were administered on 12 and 13 January to help replace blood loss. Dyspnea improved slightly after this. The improvement was only temporary, however, and on 20 January he required continuous oxygen and was still extremely dyspneic. After 10 January his temperature ranged from 98.6° to 100°F, occasionally going as high as 101°F. On 21 January his condition was critical. He received continuous oxygen but remained extremely dyspneic, and on 22 January he died at 0630 hours.

DISCUSSION

Doctor Dunnington:* Doctor Leckert, would you present the electrocardiograms?

Doctor Leckert:** The electrocardiogram on 20 December 1954 showed the auricular and ventricular rates to be 98 per minute (fig. 1). The P-R interval was 0.12 second; the QRS was 0.08 second; the Q-T interval was 0.34 second. The QRS complexes in the standard and augmented unipolar leads were low. The T waves were inverted in leads I and aVL. The T waves were low and biphasic in leads II and $V_{3,4,5,6}$. The electrocardiogram of 14 January 1955 showed the auricular and ventricular rates to be 125 per minute. The P-R interval was 0.14 second; the QRS was 0.08 second; the Q-T interval was 0.30 second. There was a Q wave in leads III, aVF, and $V_{1,2}$. There were low R waves in the remainder of the precordial leads. The T waves were inverted in leads I and aVL. The T waves were low and biphasic in leads II, III, aVF, and $V_{4,5,6}$.

Doctor Dunnington: Doctor Zanca, would you present the x-ray findings?

Doctor Zanca:*** The first film is a transfer film taken on 16 December 1954 (fig. 2) and shows a generalized enlargement of the cardiac silhouette with bulging of the heart shadow to the right and to the left. The various arcs of the heart are obscured and obliterated. The transverse diameter of the heart measures 18.8 cm and the transverse diameter of the thorax measures 33.0 cm (about 45 per cent enlargement). The heart assumes a flask-shape configuration and suggests the pres-

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**Capt. John T. Leckert, MC, USA, Chief, Cardiovascular Service.
***Col. Peter Zanca, MC, USA, then Chief, Radiology Service.

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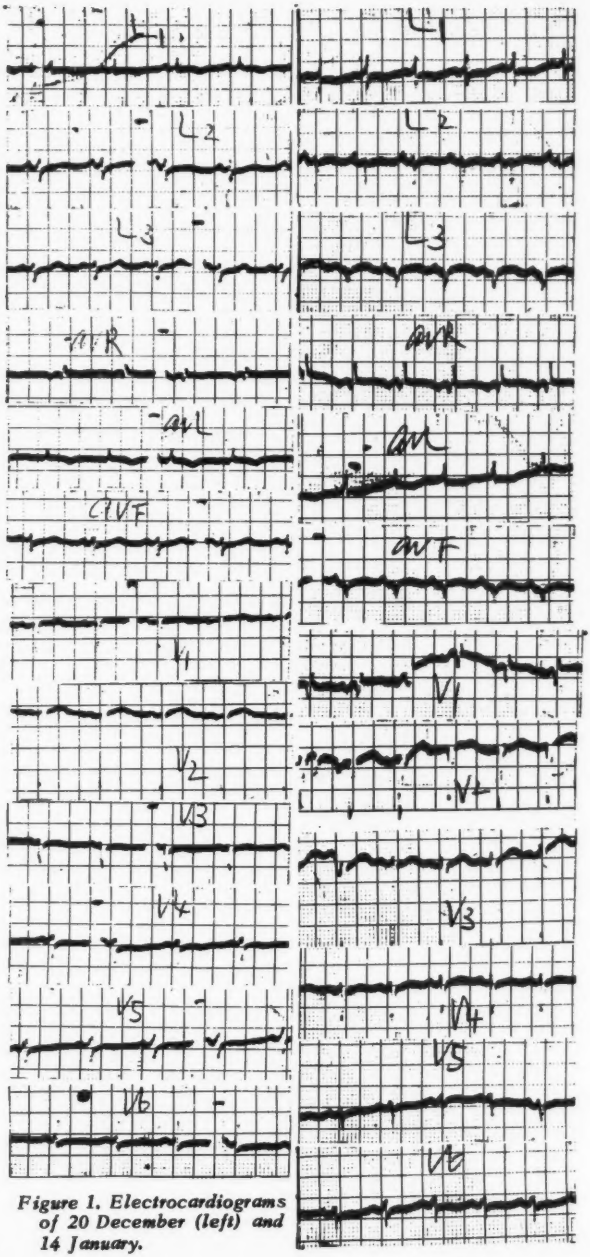

Figure 1. Electrocardiograms of 20 December (left) and 14 January.

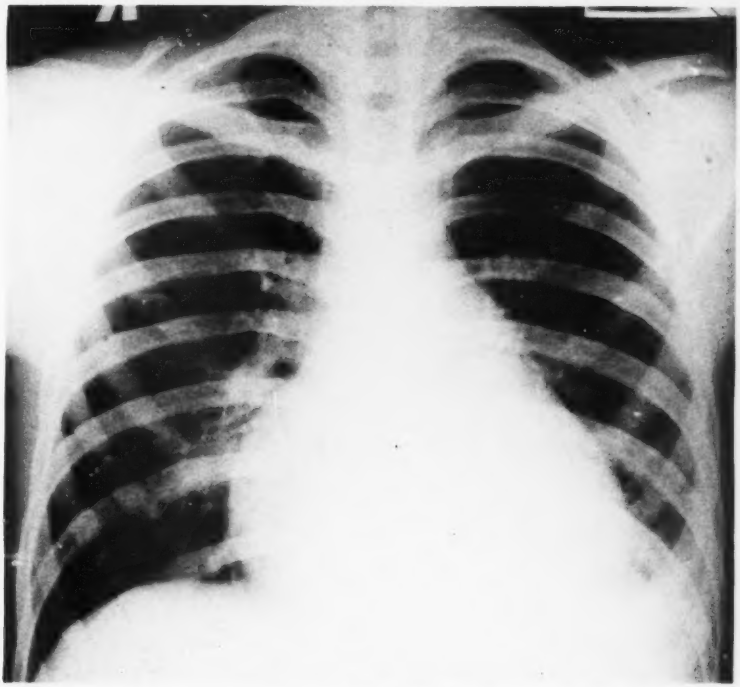

Figure 2. Roentgenogram showing a generalized enlargement of the heart.

ence of a massive pericardial effusion. The hilar shadows are not enlarged. There is some tenting of the dome of the left hemidiaphragm and there is an obliteration of the left costophrenic sulcus which has a concave border and suggests the presence of a small pleural effusion. The lung fields are otherwise clear. I am unable to tell whether there is any cardiac dilatation or any specific chamber enlargement.

The second and third chest films, taken on 20 and 22 December, show no change in the x-ray findings.

The fourth chest film was taken on 30 December following pericardial aspiration, and on this film (fig. 3) the transverse diameter of the heart was 15.9 cm. The pleural effusion was unchanged and the remainder of the lungs were clear.

The chest film taken on 10 January 1955 shows severe bilateral pulmonary congestion and edema (fig. 4). There is a soft, blotchy parenchymal infiltration which has a butterfly pattern. The infiltration is most dense in the inner and middle zones of the lung fields. There is still a small pleural effusion on the left. The transverse diameter of the heart now measures 17.2 cm. The roentgenologic picture at this time suggests cardiac failure with pulmonary congestion and edema.

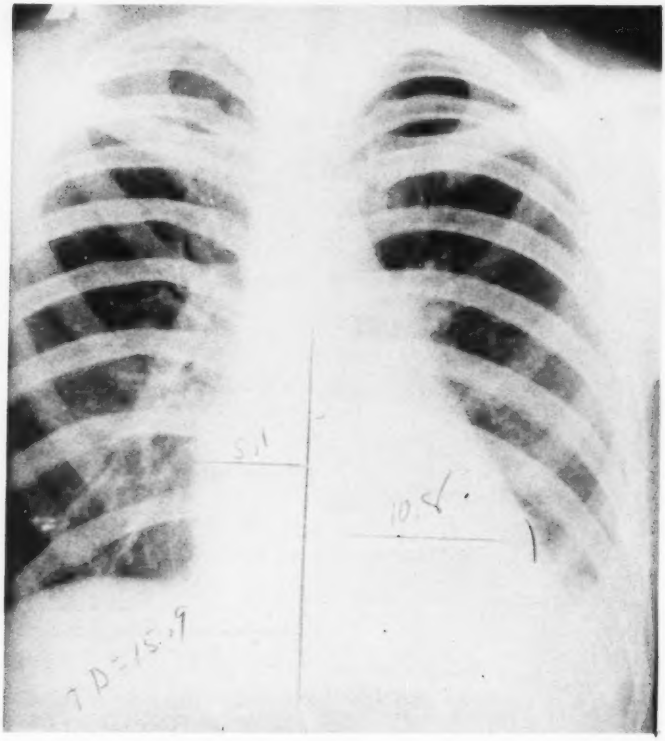

Figure 3. Roentgenogram of chest following pericardial aspiration.

The last two films taken on 11 and 18 January (fig. 5) show an increase in the pulmonary congestion and edema bilaterally.

Doctor Dunnington: Doctor Leckert, would you begin the discussion?

Doctor Leckert: I am going to consider this case first in the light of the original findings and then, as I go along, try to analyze the subsequent events. The original picture is that of a 21-year-old white man with symptoms of two months' duration who presented himself with petechiae, a pericardial effusion, and eosinophilia. At this time he was afebrile. Tuberculosis, malignancy, idiopathic pericarditis, Boeck's sarcoid, disseminated lupus erythematosus, and rheumatic fever will be considered in the differential diagnosis.

Tuberculous pericarditis may arise by contiguous extension from the hilar or mediastinal nodes or from pleuropulmonary tuberculosis. This may be the result of direct contact or as the result of retrograde lymphatic extension. Occasionally, pericarditis may result from hematogenous dissemination, but here it is usually an insignificant part

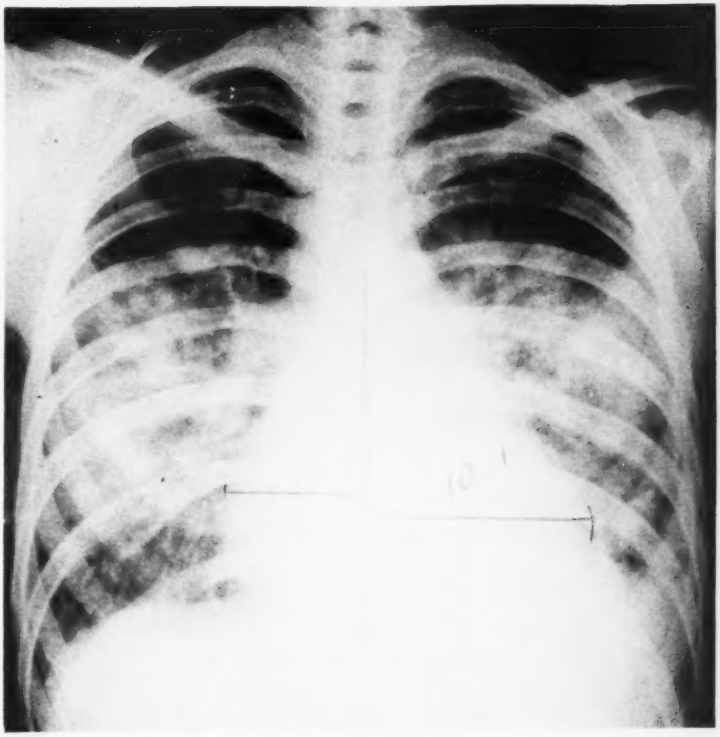

Figure 4. Roentgenogram showing bilateral pulmonary congestion and edema.

of the miliary dissemination. In this case the latter is unlikely because initially the patient was afebrile. Eosinophilia is usually not associated with tuberculosis. However, Wintrobe[1] states that extensive caseous tuberculosis of the lymph nodes can be accompanied by eosinophilia. In this patient the PPD tuberculin test was consistently negative. Amberson[2] mentions five situations that may cause the tuberculin reaction to be depressed or absent. The lesions may be thoroughly healed and calcified. The dose of tuberculin may be too small. A false negative reaction can occur in the presence of severe measles or influenza. The test may be negative in the latter months of pregnancy, or in an occasional terminal case. Of these, only the last is applicable in our patient.

The second possibility that might explain the initial picture is a primary or metastatic malignant process involving the pericardium. The most common of the metastatic tumors involving the heart arise from the bronchi, lungs, and breast.[3] Many other primary sites have been reported. The fluid is frequently serosanguineous and malignant cells

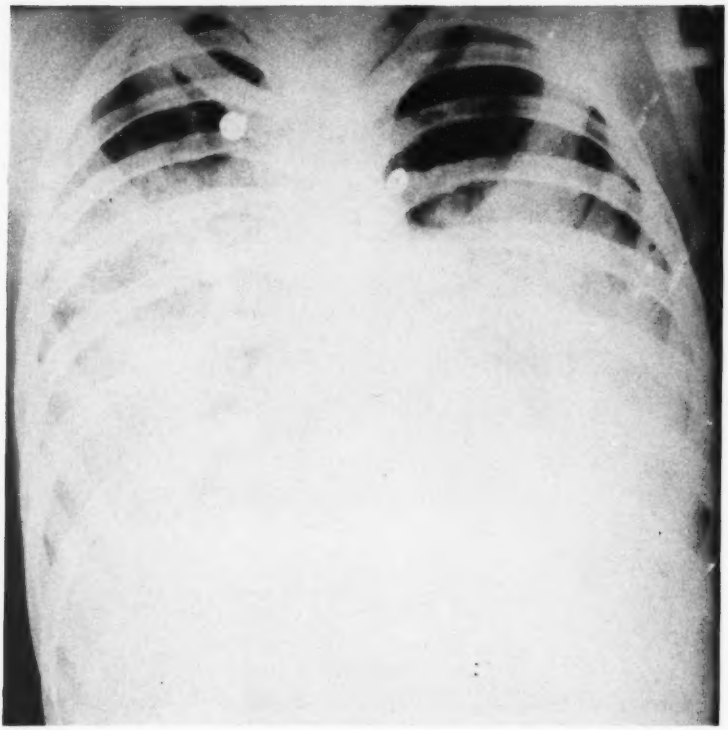

Figure 5. Roentgenogram showing increase in pulmonary congestion and edema.

have been isolated in pericardial taps. In this patient the pericardial fluid was negative for malignant cells. Primary sarcomas may arise from the heart or pericardium. Frequently there are localized bulges of the cardiac silhouette on roentgenograms of the chest. Isaacson and Rapoport[4] reviewed the literature and reported 15 cases of their own of eosinophilia in patients with malignant tumors. They concluded that it is indicative of dissemination of the malignant process.

Goyette[5] has reported 28 patients with acute benign pericarditis. Four of these presented pericardial effusion. Sixteen showed an elevation of the white blood cell count above 10,000/μl. Eosinophilia is not mentioned. Some of the original picture in this case could certainly be explained by idiopathic pericarditis. However, the subsequent course makes this diagnosis untenable.

Boeck's sarcoid may cause pericardial involvement. It would also explain the negative tuberculin tests and the elevated serum calcium. Eosinophilia up to 35 per cent has also been reported in sarcoidosis.[6]

Disseminated lupus erythematosus is a common cause of pericardial effusion. However, this patient is male. There are no signs of skin, joint, or renal involvement. There is a leukocytosis rather than the typical leukopenia, and the L.E. cell preparation is negative.

Rheumatic fever may cause pericardial effusion. However, this is usually associated with some other manifestation of rheumatic fever.

On 10 January the patient coughed up gross blood with mucoid sputum. Examination of the chest revealed crepitant rales throughout. A roentgenogram of the chest showed a soft, mottled infiltration throughout both lungs. Previous films had only demonstrated the pericardial effusion. This most probably represents a further dissemination of the original process. Three possibilities stand out at this time: tuberculosis, Boeck's sarcoid, and malignancy.

Tuberculosis could easily explain most of this picture, except that with pulmonary dissemination one would expect more fever and there should have been some response to streptomycin sulfate and INH. The tuberculin test was negative, but in the occasional terminal case this may be true. Petechiae are not a manifestation of tuberculosis.

Boeck's sarcoid could possibly produce the pulmonary lesions. However, the exodus seems too fast for this disease. The pulmonary process in sarcoidosis[7,8] presents a more chronic course.

With the pulmonary spread one naturally wonders about a malignant process and we cannot forget the lymphomas, because they may present a similar picture.

Rheumatic fever is occasionally associated with a rheumatic pneumonia, but of the six fatal cases reported by Seldin and associates[9] all showed evidence of valvular heart disease.

One might conclude that this patient had originally an idiopathic pericarditis with a superimposed pneumonia. However, this would not explain the eosinophilia and petechiae. In addition, the febrile response was quite low for an ordinary pneumonia.

Zeek[10] has applied the term necrotizing angiitis to a group of vascular lesions characterized in their fully developed stage by inflammatory reaction and fibrinoid necrosis. Under this group she lists five entities:

1. Periarteritis nodosa: This is a recurrent, progressive, necrotizing, inflammatory lesion of the muscular-type arteries. It has predilection[11] for the gastro-intestinal tract, kidneys, striated muscles, and near peripheral nerves.

2. Temporal arteritis:[12] This involves temporal and other cranial arteries.

3. Rheumatic arteritis: This is associated with a fulminating type of rheumatic carditis with arterial lesions of the heart and lungs. Occasionally it may be widely disseminated.

4. Hypersensitivity angiitis: In these cases the illness lasts a few days to one month with involvement of the arterioles, venules, capillaries, and small arteries. It has predilection for the kidneys and heart; often the lungs and spleen are involved. It is unknown in the gastrointestinal tract.

5. Allergic granulomatous angiitis: Churg and Strauss[15] described 13 cases of this entity Five cases demonstrated pericarditis, two of which were in an acute fibrinous stage. It is frequently associated with asthma or other allergic states. The duration of the illness is several months to several years. There is involvement of any size vessel, especially small arteries and veins. Grossly, nodules may be related to small vessels. However, the most characteristic lesions are noted microscopically in the intrinsic vessels of the viscera, most predominantly the heart and lungs. The small nodules are made up of numerous eosinophils undergoing necrosis, severe fibrinoid change in the connective tissue, and granulomatous proliferation of the epithelioid and giant cells.

It is my impression that this patient falls into the necrotizing angiitis group and of the described entities his symptoms more closely resemble allergic granulomatous angiitis. This could explain the petechiae, pericarditis, eosinophilia, and pulmonary lesions.

Doctor Dunnington: Doctor Zanca, would you discuss the x-ray findings?

Doctor Zanca: From the first film all that can definitely be said is that there is a massive pericardial effusion and a small pleural effusion on the left side. With regard to the pericardial effusion: (1) Acute pericardial effusions are usually the result of suppurative infection, rupture of an aneurysm, or rupture of a malignant tumor into the pericardium. I am unable to exclude this possibility. (2) A subacute pericardial effusion may be secondary to rheumatic heart disease (I am unable to rule out this possibility at this time), toxemia, or severe anemias. (3) A chronic pericardial effusion may result from tuberculosis, myxedema, or hypoproteinemia. As for the pleural effusion seen on the left side, this condition (1) may be secondary to an inflammatory process, such as pyogenic infection or tuberculosis, (2) may represent a transudate as a result of vascular and lymphatic engorgement, (3) may be secondary to a primary or metastatic malignant tumor, or (4) may even be secondary to pulmonary infarct or embolism.

Doctor Dunnington: Can the cardiac shadow represent any other disease condition besides pericardial effusion?

Doctor Zanca: Yes, in generalized cardiac enlargement the contour and configuration of the heart may be exactly the same as in massive pericardial effusion. I will list and rule out some of the more common

causes of generalized cardiac enlargement which might simulate massive pericardial effusion: (1) various congenital heart conditions (to name one, atrial septal defect with rheumatic mitral regurgitation); (2) chronic severe anemias; (3) hyperthyroidism; (4) myxedema; (5) myocarditis, secondary to diphtheria, scarlet fever, or pneumonia (rheumatic myocarditis can give this picture and cannot definitely be ruled out); (6) toxic lesions of the heart, such as drug poisoning; and (7) coronary sclerosis or thrombosis. This last is the most likely picture in this case, especially since there is an associated left pleural effusion. In 60 per cent of all myocardial infarctions there is an associated left pleural effusion or hydrothorax.

In the second phase of the patient's illness the differential diagnosis should include all of the conditions which can cause cardiac failure. Here we can rule out: (1) cardiorenal disease (no evidence of nephritis); (2) hypertensive heart disease (as the cardiac configuration did not conform with the characteristic hypertensive aortic and ventricular pattern); (3) decompensated cor pulmonale (no associated underlying pulmonary changes); and (4) rheumatic heart disease (as in addition to the hydrothorax one would expect pulmonary infarcts). I am unable to exclude the possibility of idiopathic pericarditis. The most likely diagnosis is coronary thrombosis or sclerosis, since an associated left-sided pleural effusion is frequently found in myocardial infarction.

Doctor Dunnington: Doctor Leckert, are the electrocardiographic findings compatible with a myocardial infarction?

Doctor Leckert: The electrocardiogram of 20 December 1954 with inverted T waves in Leads I and aVL with low T waves in the precordial leads is abnormal and compatible with pericarditis or myocardial disease. The second, on 14 January 1955, in addition shows a Q wave in Leads III and aVF. This tracing is compatible with a posterior myocardial infarction. However, inspiratory leads were not taken and it is conceivable that these Q waves could be due to heart position. The second electrocardiogram also shows Q waves in $V_{1,2}$ with low R waves in the remainder of the precordial leads. These findings could be explained by an anteroseptal myocardial infarction.

Doctor Dunnington: Doctor Buchanan, would you discuss the case?

Doctor Buchanan:* I would agree with the principal discussor, Doctor Leckert, that the most likely diagnosis is necrotizing angiitis. However, I do believe that the various parasitic diseases which are common in the Far East should be considered. This individual had a pleuropericardial effusion, pulmonary infiltration, and marked eosinophilia. There are three prominent parasites which can give a picture resembling this. Most common in Korea, among the local population is *Paragonimus westermani.* The parasite, in boring through the diaphragm and into the lungs, may burrow into the pericardium and myocardium as well

*Maj. David P. Buchanan, MC, USA, Chief, Gastroenterology Service.

as involve the pleura and lungs. It can give a pulmonary disease accompanied by eosinophilia and the production of copious mucoid, hemorrhagic sputum. In the disease the ova of Paragonimus are easily demonstrable in the sputum and I believe that this diagnosis would not be tenable here.

Nematodes, primarily Strongyloides, as part of their migration into the body, burrow into and under the bronchial mucosa and can cause pericarditis and bronchitis, as well as changing pulmonary infiltrations and eosinophilia. I believe that of the parasitic diseases, Strongyloides infestation is the most likely.

Hookworm disease can cause a similar syndrome, but this parasite can more easily be found in the feces.

Doctor Dunnington: What studies were made to rule out parasitism?

Doctor Leckert: The stool and sputum examinations were negative for ova and parasites.

Doctor Dunnington: Doctor Chandler, would you care to add anything to the discussion?

Doctor Chandler:* In reviewing this patient's course, I believe that periarteritis nodosa should be rather strongly considered. The patient had a persistent eosinophilia and involvement of two serous surfaces, the pericardium and pleura. There was a reversal of the albumin-globulin ratio. I feel that the changes that occur in the vessels of the heart in this disease could account for the subsequent marked enlargement and the failure that the patient had. Against this diagnosis is the fact that the urinalysis, except for a slight trace of albumin on admission, was completely negative. In addition there was neither hematuria nor hypertension. However, since in this case the clinical course is not typical of any disease that I can think of, I would like to cast my vote for periarteritis nodosa.

Dr. Leckert's diagnosis:
Allergic granulomatous angiitis

Dr. Zanca's diagnosis:
Coronary thrombosis or sclerosis

Dr. Buchanan's diagnosis:
Necrotizing angiitis

Dr. Chandler's diagnosis:
Periarteritis nodosa

Doctor Dunnington: Doctor Blumberg and Doctor Tsumagari, would you present the autopsy findings?

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*Maj. Bruce F. Chandler, MC, USA, Chief, Medical Consultation Service.

PATHOLOGIC FINDINGS

Doctor Tsumagari:* At autopsy the pathologic findings were confined largely to the heart, lungs, and left kidney. On opening the body the heart was enlarged. It weighed 400 grams; the pericardial space was obliterated by adhesions. On opening the heart we found that all walls showed multiple areas of infarction of varying ages consistent with the clinical course. Both ventricles were slightly enlarged. Within all chambers, there were firmly attached mural thrombi. None of the coronary arteries showed evidence of thrombi grossly. The ostium of the right posterior descending coronary artery was less than 1 mm in diameter. When this vessel was dissected there was found a postostial dilatation. Microscopic examination of the larger coronary vessels showed varying degrees of intimal thickening. The smaller vessels, however, presented occlusive thrombi with increased amounts of sclerosis.

The lungs were two and a half times heavier than normal. All lobes showed areas of recent hemorrhagic infarctions. The examination of the pulmonary arteries disclosed occlusive thrombi. There was a generalized thickening of the interstitial tissue and evidence of long-standing congestion.

In the left kidney there was an area of ischemic infarction as evidence of thrombo-embolic phenomena. In addition there was microscopic evidence of thrombo-embolic phenomena in the brain. The liver showed anoxic changes around the central veins which were associated with the congestive failure.

Doctor Blumberg: This case is presented because of an unusual clinical expression of heart disease in a young man that was unrecognized as such during his life due to an absence of precordial pain, presenting signs of pericardial effusion, and failure to recognize the importance of the electrocardiogram. In the localization of the distribution of occlusion of coronary arteries 68 per cent showed occlusion in the first 3 cm of the coronary vessels.[14] In this case the right coronary ostium was almost completely occluded, but without thrombus. The case is interesting, in that the disease in the patient's coronary vessels involved the smaller branches at many points rather than one large single thrombus. Why he did not have precordial pain is not known; however, in this case his pain seemed to be confined to the epigastrium. It is felt by some that an accumulation of metabolites in the myocardium combined with inadequate circulation is the cause of pain in coronary disease. Within a period of weeks the patient presented many small focal lesions which involved only small areas of the myocardium at a time. This may account for the lack of sharp precordial pain. There was no evidence of old scars to indicate that these episodes had occurred earlier. We must be aware that this is a disease of young people, the incidence

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being 0.1 per 100,000 population between the ages of 18 and 19 with a gradual rise to ages 35 to 39 of 12 per 100,000 men per year. All other changes found at autopsy were related to the primary disease affecting the coronary vessels which followed a natural history of mural thrombi, emboli, infarction, chronic passive congestion, heart failure, and death.

Pathologic diagnosis:
Coronary thrombosis with myocardial infarction

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The specialist is too commonly hypertrophied in one direction and atrophied in all the rest.—Martin T. Fischer

SUSCEPTIBILITY OF WESTERN EUROPEAN BODY LICE TO PYRETHRUM AND DDT

FREDERICK W. WHITTEMORE, Jr., *Lieutenant Colonel, MSC, USA*

CONTROL of body lice for the prevention of epidemic typhus fever is not a serious problem in Western Europe at this time, but could quickly become so under wartime conditions. During the early phase of the Korean conflict, the body lice infesting prisoners and refugees were so resistant to DDT that they could not be effectively controlled by its use.[1,2] Subsequent experiments at the 406th Medical General Laboratory showed that Japanese strains of body lice also were resistant to DDT.[3]

These experiences resulted in tests at this laboratory in 1952 to determine the susceptibility to DDT of German strains of body lice.[4] Although kills of better than 90 per cent were obtained with application rates of 13 and 27 mg of 10 per cent DDT powder per square inch of treated surface, showing that effective control could still be obtained with the standard item, the results also indicated that European strains were less susceptible to DDT than is the strain being reared at the Orlando, Fla., Laboratory of the Entomology Research Branch, Agriculture Research Service, United States Department of Agriculture. This strain is reported[1] to give fairly consistent 100 per cent kills in 24 hours when lice are exposed to 0.1 per cent DDT powder applied to 4.9-inch square patches of balbriggan cloth at the rate of 0.5 gram per patch. This rate of application is equivalent to 21 mg of a 0.1 per cent DDT powder, a dosage rate 1/100th of that which failed to give 100 per cent kills with the European strains. To confirm the results previously obtained at this laboratory, further tests were conducted using the concentration and rate of application reported to give 100 per cent kills in the United States.

Both DDT and pyrethrum louse powders are stored by the Army Quartermaster in Western Europe, the pyrethrum powders having been procured early in World War II. Some pyrethrum formulations are known to decompose in storage, thus raising the question of the effectiveness of pyrethrum louse powders 11 or

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more years old. Accordingly tests were also conducted, using both old and freshly prepared pyrethrum louse powders, to establish the effectiveness of this old stock of materials should it become necessary to use them.

Although no definite figures on the use of DDT in either West or East Germany are available, events in the immediate past history of the two areas would lead to the supposition that DDT has been used far more extensively in West Germany than in East Germany. For example, one Army unit alone, in 1944 and 1945, used over 37 tons of 10 per cent DDT powder for the mass delousing of over 2,000,000 persons.[4] In more recent years, DDT has been used extensively, both by the military services and within the West German economy, for a wide variety of insect-control problems. For example, the Federal Minister of West Germany for Food, Agriculture, and Forestry reported[5] that in 1952 nearly a million pounds of 100 per cent DDT was used in various formulations in agricultural and forestry activities.

The nature of the economy in East Germany on the other hand, coupled with such vague reports as those concerning the losses being caused by the Colorado potato beetle, an insect readily controlled with DDT, would indicate that the use of DDT in that area is extremely limited. Since in many instances DDT susceptibility appears to be inversely related to the extent and intensity of use of DDT, body louse strains from two areas differing in their past history of the use of this insecticide might differ in their susceptibility to DDT. Accordingly, tests were also conducted to compare the effectiveness of DDT and pyrethrum for the control of East German and West German strains of body lice.

EXPERIMENTAL PROCEDURE

The strains of body lice and the rearing methods used for these tests have been previously described,[4] the lice having been obtained from vagrants in the Frankfurt City Jail and a refugee from East Germany. Rearing methods were unchanged except that the lice were fed by placing them upon the exposed back of a volunteer lying face down on a laboratory table. This slight modification of the feeding procedure allowed more lice to be fed at one time in a manner that would ensure that the strains would remain segregated.

The testing procedure employed differs markedly from that previously used and is based upon a testing protocol[6] developed by the Orlando Laboratory. This provides for exposing lice for 24 hours on 4.9-inch square patches of balbriggan cloth treated with 0.5 gram of various dilutions of DDT and pyrethrum louse powders. This rate of application is equivalent to about 2½ ounces of dust per uniform. The lice were confined on the cloth

under weighted Petri dishes and placed in an incubator maintained at 85°F and 60 per cent relative humidity. At the end of this period results were evaluated in terms of living, moribund, and dead lice. Living lice were regarded as those capable of normal co-ordinated walking movements, moribund lice as those showing un-co-ordinated movement, and dead lice as those showing no movement when prodded with a needle.

TOXICOLOGIC TESTS

Susceptibility of West German Strains of Body Lice to DDT. A series of tests were conducted in which West German strains of body lice were exposed to various concentrations of DDT powder at the rate of 21 mg of dust per square inch of treated surface, a single test employing 10 male and 10 female lice.

The results of these tests, together with results previously obtained at this laboratory, are summarized in table 1. Appreciable numbers of lice survived exposures to 0.1, 0.5, and 1.0 per cent DDT powders, concentrations that would be expected to give fairly consistent 100 per cent kills of the U. S. strain in 24 hours.

TABLE 1. *Mortality of West German strains of body lice exposed for 24 hours to various concentrations of DDT powder*

Concentration of DDT (per cent)	Mg per sq in.		Total no. of lice	Percentage of lice		
	Dust	DDT		Alive	Moribund	Dead
Control	- - -	- - -	200	100	0	0
0.1	21	0.02	80	12.5	18.8	68.7
0.5	21	0.11	200	12.0	9.0	79.0
1.0	21	0.21	200	4.0	7.5	88.5
5.0	21	1.05	80	0	2.5	97.5
			Bunn[4]			
10.0	13	1.30	500	3.6	5.6	90.8
10.0	27	2.70	400	0.7	5.5	93.8

Effectiveness of 11-year-old Pyrethrum Louse Powder Formulations. The effectiveness of freshly prepared pyrethrum louse powders furnished by the Orlando Laboratory was compared with that of samples of pyrethrum louse powder taken from stocks in this command, which was procured early in World War II and had the following composition: 0.2 per cent pyrethrins (1 per cent of a 20 per cent pyrethrum extract); 2.0 per cent 2,4-dinitroanisole; 2.0 per cent N-isobutyl undecylenamide; 0.25 per cent Phenol S; and 94.75 per cent Pyrax.

Since freshly prepared formulations of this potency can be expected to give 100 per cent kills in 24 hours, both freshly prepared and old powders were diluted 1:4 and 1:9 with Pyrax to give pyrethrins concentrations of 0.04 per cent and 0.02 per cent, respectively. Using 0.5 gram of these two dilutions of the old louse powders per patch, 100 per cent kills in 24 hours were obtained (table 2). Accordingly, an additional series of tests were run using only 0.1 gram of the diluted powders per patch. Very low kills were obtained with these reduced rates of application, but the freshly prepared powder, containing 0.04 per cent pyrethrins, applied at the rate of 4.2 mg per square inch, affected or killed 80 per cent of the lice, whereas the 11-year-old powder at the same dilution and rate of application affected or killed only 14 per cent (table 2).

TABLE 2. *Mortality of West German strains of body lice exposed for 24 hours to various dilutions of freshly prepared and 11-year-old pyrethrum louse powders*

Type of formulation	Per cent pyrethrins	Mg per sq in.		Total no. of lice	Percentage of lice		
		Dust	Pyrethrins		Alive	Moribund	Dead
Fresh	0.02	4.2	.0008	80	86	5	9
Fresh	0.04	4.2	.0017	80	20	66	14
Old	0.02	4.2	.0008	320	91	5	4
Old	0.04	4.2	.0017	320	86	9	5
Pyrax	0.00	4.2	.0000	80	96	0	4
Control	0.00	0.0	.0000	40	95	2.5	2.5
Old	0.02	21.0	.0042	420	0	0	100
Old	0.04	21.0	.0084	420	0	0	100
Pyrax	0.00	21.0	.0000	120	87	6.5	6.5
Control	0.00	0.0	.0000	120	100	0	0

Comparative Effectiveness on East and West German Strains of Body Lice of DDT and Pyrethrum Louse Powders. Males and females of the Frankfurt and Berlin louse strains were exposed in lots of 20 to various DDT and pyrethrum louse powders for 24-hour periods. The results, as summarized in table 3, show that all lice reacted to pyrethrins in about the same manner regardless of strain or sex, but that the West German (Frankfurt) strain did not appear to be as susceptible to DDT as was the East German (Berlin) strain.

TABLE 3. *Mortality of East and West German strains of body lice exposed for 24 hours to various concentrations of DDT and pyrethrum louse powders applied to test patches at the rate of 21 mg per square inch*

Insecticide formulation	Frankfurt strain				Berlin strain			
	Total number of lice	Percentage of lice			Total number of lice	Percentage of lice		
		Alive	Moribund	Dead		Alive	Moribund	Dead
Males								
0.1% DDT	60	47	25	28	60	5	10	85
0.5% DDT	60	2	13	85	60	0	0	100
1.0% DDT	60	15	17	68	60	0	0	100
5.0% DDT	20	0	0	100	60	0	0	100
0.02% pyrethrins	60	3	48	49	60	3	25	72
0.04% pyrethrins	20	0	5	95	60	0	0	100
Untreated control	60	100	0	0	60	100	0	0
Females								
0.1% DDT	60	62	22	16	60	20	7	73
0.5% DDT	60	15	12	73	60	0	2	98
1.0% DDT	60	23	27	50	60	0	2	98
5.0% DDT	20	0	10	90	60	0	2	98
0.02% pyrethrins	60	0	58	42	60	0	35	65
0.04% pyrethrins	20	0	0	100	60	0	5	95
Untreated control	60	100	0	0	60	100	0	0

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DISCUSSION

The results obtained by exposing West German strains of body lice to various concentrations of DDT confirm the results previously obtained at this laboratory,[4] from which it was concluded that 10 per cent DDT louse powder could still be expected to achieve satisfactory body louse control in West Germany. A further supposition raised by the previous work, to the effect that European strains might be slightly more resistant to DDT than are the strains maintained in the United States, is confirmed by the recent tests, since consistent 100 per cent kills were not obtained with 0.1 per cent DDT powder. In the third series of tests (table 3), even lower kills were obtained with the Frankfurt strain than were obtained in the tests summarized in table 1.

In tests to determine the relative effectiveness of freshly prepared and 11-year-old pyrethrum louse powders, 100 per cent kills were obtained with the diluted 11-year-old material, and although there was indication that this old material had lost some of its potency, the loss was not appreciable. All tests resulting in less than 100 per cent mortality involved the use of diluted powders at *rates of application far below the recommended rate.*

A comparison of the results obtained with East and West German strains of body lice indicates that the West German strain is slightly less susceptible than the East German strain to DDT, but that the two strains are equally susceptible to pyrethrins. This finding is in agreement with that of other workers,[1] who report that DDT-resistant strains of body lice in Korea appear to be about as susceptible to pyrethrum louse powders as are the DDT-susceptible strains maintained in the United States.

SUMMARY

Strains of West German and East German body lice were evaluated for their susceptibility to DDT and to pyrethrum louse powders. While a minor difference was found in the susceptibility of the two strains, the West German strain exhibiting a slight resistance to DDT, both strains can be adequately controlled with either 10 per cent DDT powder or pyrethrum powder. *Eleven-year-old stocks* of pyrethrum louse powders were found to be completely effective.

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SLOW PROGRESS

The scientist must be constantly engaged in the acquisition of two mental characteristics, objectivity and tolerance. He who attempts to cultivate an attitude in which these elements predominate is likely to experience much discouragement when he realizes how slowly a gradual approximation to this state progresses. He may, however, take heart from a consideration of the fact that it is a recognized characteristic of living organisms that changes in a particular direction are often slow in manifesting themselves. Even a simple microbial adaptation may involve periods of time considerably in excess of the generation time of the organism, and a truly significant advance in scientific understanding is an event of rare enough occurrence in spite of the vast amount of time that a large number of scientists devotes to increasing our knowledge.

—C. B. VAN NIEL
in *Bacteriological Reviews*
pp. 4-5, Mar. 1955

ACCIDENTAL DEATHS IN MILITARY VEHICLES

In Relation to the Use of Seat Belts

ROBERT W. BABIONE, *Captain, MC, USN*

THE ENORMOUS cost in both manpower and money of injuries and deaths caused by motor vehicle accidents is receiving increasing attention in the military services. Bedwell[1] analyzed data on accidental trauma in the Armed Forces and found that in 1953 over 22,000 injuries to personnel resulted from accidents involving ground motor vehicles. McFarland[2] reported that each year about 2,100 servicemen are killed in automotive accidents. The Air Force estimated that one fatality costs the government $31,500, and each total disability $63,500. Wenger[3] pointed out the advantages of several safety devices in automobiles, naming the use of seat belts as "the first, simplest, and perhaps under present circumstances, the most effective procedure."

Studies made by Moore and Tourin[4] under the sponsorship of the Commission on Accidental Trauma of the Armed Forces Epidemiological Board indicated that in an automobile accident, being thrown from the vehicle greatly increases the probability of serious injury and the risk of being killed. Their evidence led to a recommendation by the Board in May 1955 that seat belts be installed in military ground vehicles. It was expected that this would result in a direct reduction in injuries and an indirect improvement through inspiring military personnel to use seat belts in their privately owned vehicles.

In regard to open-top vehicles (jeeps, personnel and weapons carriers, trucks without cab, et cetera), considerable doubt exists as to the relative hazard of seat belts—whether it is better or worse to be strapped to the seat in event of an accident. This depends on the proportion of accidents in which the vehicle rolls over. Data limited to deaths alone can provide only a partial answer, because conceivably, non-rollover accidents may cause many serious but relatively few fatal injuries preventable by the use of seat belts, while in rollovers of open-top vehicles, being thrown clear may often prevent more serious injury.

In order to estimate the limits of possible benefits in respect to mortality that might accrue if seat belts were installed in

From Armed Forces Epidemiology Board, Washington 25, D. C.

military-owned vehicles, data have been collected from death certificates and investigation reports covering all deaths of Navy and Marine Corps personnel in accidents involving government-owned ground vehicles during the period 1952 through 1954. Table 1 shows an analysis of these deaths, classified as to type of vehicle, whether or not rollover occurred, and whether or not the victim was thrown clear.

Two broad types of vehicles are involved, open-top and hard-top. In those accidents involving open-top vehicles rolling over, it seems unlikely that the number killed would have been reduced if seat belts had been worn; rather, it seems probable that they would have been increased. On the other hand, table 1 shows a number of deaths in which the use of seat belts would have greatly improved the chance of survival. These include most if not all of the fatalities in hard-top vehicles where the victim was thrown out of the vehicle, with or without rollover. Passengers in the hard-top vehicles who were not ejected usually suffered only slight injuries.

The period covered includes the Korean conflict, which explains the high percentage of the deaths (41 out of 72) that occurred in connection with jeeps, weapons carriers, heavy trucks, and one DUKW (duck). In normal peacetime, deaths in these military-type vehicles would be a smaller proportion of the total. Twenty of the 41 occurred in Korea, 12 elsewhere outside the United States (mainly Japan and Puerto Rico), and 9 within the United States. These open-top vehicles rolled over in 33 out of 38 deaths in which the vehicle was involved in an accident. In five deaths the vehicle was damaged but did not roll over, and in three cases, a passenger fell off and was killed without an accident to the vehicle.

Considering that in all "rollover" deaths from trucks and in half of those from jeeps and weapons carriers the victims were pinned down or rolled on by the vehicle, the assumption seems confirmed that no reductions and perhaps increases in death rates would occur if seat belts were installed in such vehicles. This is based on the fact that only eight deaths conceivably might have been prevented, *i. e.*, five where the vehicles were in accidents and did not roll over, and three where a passenger fell off a heavy truck that was not in an accident. These three would definitely have been saved by seat belts, although belts would not have been easy to apply to passengers seated, as they were, in the back of heavy trucks. Contrasted with this are 10 persons involved in the rollover accidents who escaped death by being thrown out. These 10 presumably would have died, if they had been tied down by seat belts. Of the 33 deaths where the vehicle rolled over, almost all involved a crushing injury, the victim being pinned down or rolled on. It is assumed that

TABLE 1. *Vehicular fatalities by type of accident in U. S. Navy and Marine Corps personnel in U. S. Government vehicles only (1952 through 1954)*

Type of vehicle	Driver or passenger	Vehicle not in accident, Man fell off	Vehicle in accident				Location		
			No rollover		Rollover			Overseas	
			Stayed in	Thrown out	Pinned down	Thrown out	U. S.	Korea	Other
OPEN TOP									
Jeep	Driver			2	5[b]	4[a]	2	5	4
	Passenger		1		1	3	2		3
Weapons carrier	Passenger			2	4	1	1	4	2
Heavy 6 by 6 truck	Driver				8		3	4	1
	Passenger	3			6[c]		1	6	2
DUKW (duck)	Passenger				1			1	
Caterpillar	Driver	3					1		2
HARD TOP									
Fire or crash truck	Driver					2	2		
	Passenger	6			1[e]		4	1	2
Gasoline truck	Passenger	1					1		
Ambulance	Driver		1				1		
Pickup truck	Driver		1	3		2[d]	5		1
	Pass. (front)		1[e]	1			1		1
	Pass. (rear)					1	1		
Carryall or panel truck	Driver		1	2[d]			2	1	
	Passenger		1[e]			2[d]	3		
Dump truck	Driver		1						
	Passenger	1					2		
Total		14	7	10	26	15	32	22	18

TABLE 1. *Vehicular fatalities by type of accident in U. S. Navy and Marine Corps personnel in U. S. Government vehicles only (1952 through 1954)*—Continued

a. In one fatal accident, a passenger was thrown out and escaped with spinal injuries.
b. Jeep rolled over, killing passenger; driver was thrown out and escaped injury.
c. In one fatal accident, eight other passengers in back escaped injury.
d. In one fatal accident of each type, others in vehicle who were not thrown out were only slightly injured.
e. Drowned when vehicle ran off pier or turned over in shallow water.

Two vehicular deaths not tabulated occurred on aircraft carriers at sea. In each of these, an aircraft towing truck fell into an elevator well, the driver falling first and the truck on top of him. They are not included in the tabulation, as speed and design of this vehicle would not seem to call for use of seat belts.

these same 33 persons would have been killed had they been kept in the vehicle by seat belts, although in a number of instances they actually were thrown out before being pinned down or rolled on.

On the other hand, in 13 of the 20 deaths in accidents of panel and pickup trucks, carryalls, and other hard-top vehicles, the chances that a seat belt would have prevented the fatality appear to have been very good. In 12 cases the victim was thrown out of the cab or enclosed part of the vehicle; however, in one of these he was probably too drunk to have used a belt, leaving 11 who might have been saved. In four of the accidents the victim was fatally injured while remaining in the cab; however, in one case he was crushed by the steering wheel and in another he probably was too drunk to have used a belt, leaving 2 more who might have been saved. In three deaths the victim was drowned when the vehicle turned over into a rice paddy or plunged off a pier; and the remaining man killed was sitting on the rear of a pickup truck and was thrown out.

In the one ambulance accident involving a fatality, not only was the driver killed but also the passenger (a medical officer) was thrown about and critically injured. Considering that in 1950 another medical officer was killed in a Navy ambulance collision by being thrown from the right front seat, it would seem especially important to provide safety belt protection for the passenger on the front seat of a standard ambulance.

There were 14 deaths caused by falls from vehicles not involved in accidents. Seven of the victims were killed by falling from fire, crash, or gasoline trucks; usually when the truck was making a sharp turn. Two of these were passengers seated in the cab, and five were men standing on the truck, who lost their grip on a turn or while changing position. The two seated passengers certainly would have been saved by seat belts. It also would appear warranted to consider the use of quick-release belts to hold standees in place on certain types of fire and crash vehicles. Four of the 14 victims fell off the rear end or side rail of 6 by 6

trucks or dump trucks, and three died from falling between the frame and treads of caterpillars.

If seat belts had been installed in hard-top vehicles only, and if men had been successfully indoctrinated in using them (which will take considerable time and effort and never be fully achieved), a saving of 15 lives is the maximum benefit that could have been expected on mortality alone. If all these deaths had been prevented, the monetary saving would have amounted to over $470,000. This is only the beginning of savings possible, as many grave and costly injuries would at the same time have been prevented or converted to minor ones.

The lack of adequate data in many reports of death is a serious handicap in estimating the value of preventive measures, either potential or realized. Even more sketchy is the data on injuries which are survived. The latter are far more frequent and often much more costly in time, medical manpower, and money, than deaths. Data of immense value for planning and for subsequent evaluation could be obtained if more detailed information were required on all automobile injuries involving more than a few sick days. A minimum of 5 or 10 days might be specified so as to keep the burden of reporting within reason. The causative vehicle, the method in which injury was sustained, the presence or applicability of safety devices, all need a statistical evaluation.

SUMMARY

Deaths of Navy and Marine Corps personnel in government-owned ground vehicles are analyzed for a three-year period. More than half of these (41 out of 72) occurred in open-top military type vehicles, a higher proportion than would be expected during peacetime. Provision of seat belts in open-top vehicles would probably not have reduced but would more likely have increased these fatalities. In only five deaths did this type of vehicle remain upright when involved in an accident, whereas in 33 it rolled over. By comparison, 10 persons who escaped death in rollover accidents by being thrown out would probably have been killed if they had been kept in by seat belts.

In hard-top vehicles involved in accidents, 15 of 20 deaths would probably have been prevented if the victim had been wearing a seat belt, although in two cases he was too drunk to have used one. In 12 of the deaths, the victim was thrown from the cab, with or without rollover. Front seat passengers in ambulances appear to be especially at risk when not provided with seat belts.

Seven deaths, or one out of 10, occurred in falls from fire and crash trucks when the vehicle was merely making a turn. In two of these, the man slid off a seat. In these two cases, seat belts

would certainly have prevented the accidents had they been worn. Quick-release belts for standees should also be considered for this type of vehicle.

If seat belts are used in hard-top vehicles, potential monetary savings on deaths alone amount to $470,000 in three years. In addition, many serious and costly injuries would be prevented.

Weighing the cost of preventive measures against their savings, both in deaths and in the far more frequent nonfatal but costly injuries, requires more detailed reporting of the causes of trauma in serious and fatal vehicular accidents.

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THE NAVY — 1957

"The Navy will add six warships and five other vessels to the fleet during fiscal '57, but manpower will be decreased.

"Slated to end fiscal '56 on 30 June with 405 warships, the Navy has won Administration approval for 411 warships a year later and for 594 other ships—a total of 1105, compared with 944 planned for the end of the present fiscal year.

"The Navy will have the same number of carrier air groups, 17, and carrier anti-submarine squadrons, 31, at the start and end of fiscal '57.

"On the personnel side, newly announced plans will show the Navy beginning the year of 1 July with 662,744 officers and men, and ending the 12 month-period with 662,175.

"At the end of fiscal '57, the Navy foresees a strength level of 72,800 officers and 584,200 enlisted men, identical figures with those at the beginning of the year."

—HAROLD HELFER,
in *Our Navy*, p. 16, Mar. 1956

MINOR REFRACTIVE ERRORS VERSUS DEPTH PERCEPTION

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GOOD DEPTH perception is important to everyone, but as was pointed out when the visual screening profiles of a group of Overhaul and Repair Department inspectors at this air station were being reviewed, some who are in technical trades and professions need to excel in this particular visual skill. Because screening on depth perception was included in the routine checks along with far and near point acuity, far and near point muscle balance, and color perception, some interesting data were compiled. This is especially true of the findings on 17 men who initially failed the depth perception screening, but who passed on a second trial, after having been refracted and given a lens prescription (table 1). These data substantiate the opinion that refractive error and bad depth perception go hand in hand.

In the phenomenon of depth perception, many factors are combined before a final estimation of depth is accomplished. Although the time element involved in making an estimation is only a split second, a combined reaction to various stimuli has taken place in the observer's nervous system. For purposes of discussion, these stimuli can be called factors, and the factors classified as adjunctive (depending on the relative comparison of one outside object to another) and basic (depending solely on the observer's perception apparatus and the object under estimation). Adjunctive factors are: comparison of retinal image sizes of two familiar objects; motion parallax (*i. e.*, the apparent motion of objects within the visual field surrounding the object of fixation that is caused by movement on the part of the observer); linear perspective; and familiarity with the effects of atmospheric conditions on the appearance of distant objects. This last factor might be referred to as aerial image. Add to this the factor of accommodation (or range of focusing), and you have a fairly complete list of adjunctive factors affecting depth perception that are available to either one- or two-eyed individuals.

Since the best depth perception depends on factors which are available only to persons with binocular vision, and since this

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TABLE 1. *Depth scores in 17 subjects before and after application of lens prescriptions*

Case number	Age	Unaided visual acuity		Initial depth score*	Lens prescription			Rescreening depth score
		Right	Left		Sphere	Cylinder	Axis	
1	33	20/20	20/20[-1]	0	R −0.25 L −0.50	+0.50 +0.75	180 180	8
2	34	20/20[-2]	20/20	2	R −0.25 L −0.50	+0.75 +0.50	90 90	7
3	42	20/20	20/40	2	R −0.50 L −1.00	+0.50 +1.00	180 180	6
4	31	20/20	20/20	1	R −0.50 L Plano	+0.50 —	55 —	7
5	48	20/20	20/20	1	R +0.25 L +0.25	— —	— —	4
6	38	20/20	20/20	0	R +0.25 L Plano	— +0.50	— 180	4
7	35	20/20	20/20[-2]	0	R Plano L −0.75	— +0.50	— 180	4
8	40	20/20	20/20	0	R −0.50 L −0.25	+0.50 +0.75	180 180	5
9	46	20/20	20/20	1	R +0.50 L +0.50	— —	— —	7

TABLE 1. *Depth scores in 17 subjects before and after application of lens prescriptions*—Continued

Case number	Age	Unaided visual acuity		Initial depth score*	Lens prescription			Rescreening depth score
		Right	Left		Sphere	Cylinder	Axis	
10	44	20/20	20/20	2	R Plano L Plano	+0.75 +0.75	95 85	6
11	37	20/20	20/20	2	R Plano L Plano	— +0.50	— 90	6
12	42	20/20	$20/20^{-2}$	1	R +0.25 L +0.75	— —	— —	5
13	31	20/20	20/20	0	R +1.00 L +1.00	— —	— —	5
14	37	20/20	20/20	1	R Plano L Plano	+0.50 +0.25	180 180	5
15	29	20/20	20/20	0	R Plano L Plano	+0.50 +0.50	180 180	6
16	37	$20/20^{-1}$	$20/20^{-1}$	0	R −0.50 L −0.50	+0.75 +0.75	55 125	6
17	41	$20/20^{-1}$	20/20	0	R +0.50 L Plano	— —	— —	5

*Depth scores based on the Bausch & Lomb Optical Company system as applied to their ortho-rater screening instrument.

Maximum score possible: 9 Minimum passing score: 4

article is wholly concerned with binocular subjects, let us consider what takes place in the case of such an observer who is hampered in estimating depth by some slight anomaly in the form of a minor refractive error in one or both eyes. The foremost factor in making a depth estimate that is affected by a refractive error is binocular parallax, by means of which the two eyes working in a binocular pattern can discern the movement of an object either toward or away from the object of fixation. This is possible because binocular subjects have available to their perception apparatus overlapping retinal fields, semidecussation of optic nerve fibers, corresponding points, and conjugate movements of the eyes. Unless visual acuity is approximately equal in the two eyes, the foregoing physiologic factors will not be nearly so effective in helping to make accurate depth estimates. Just what physiochemical, neurophysiologic, or gross anatomic changes are responsible for the phenomena that refractionists call refractive errors is still open for research, but since this article is reporting only the effects of refractive errors on depth perception, I will not attempt further discussion of the physiologic processes involved.

Of about 400 inspectors examined, 17 men ranging from 29 to 48 years of age were found to have substandard depth perception; yet their failing of the depth test on routine visual screening was the first intimation that anything was amiss in their visual apparatus. None would admit to having any subjective complaint with respect to visual acuity or visual discomfort. The fact that these 17 men would be able to pass every other screening test, so long as depth perception was not checked, points up the extreme desirability of including such a test in the routine visual screening of any age or occupational group. Were it not for their having failed on the depth check, these men would not have attained the increased visual efficiency which their subsequent lens prescription afforded them.

These 17 men were not the only ones whose scores on depth screening were below the standard set for Overhaul and Repair inspectors, but they were the only ones of these who had no objective or subjective sign of any visual defect other than faulty depth perception. That the percentage of the entire group examined who failed their depth screening was low was because even prior to the inclusion of the depth check in the screening routine, the men were periodically rescreened every six months, and appropriate changes were made in their lens prescriptions. Therefore, each could be considered to be at his peak efficiency insofar as visual acuity was concerned.

All but one of the 17 men had unaided monocular visual acuity of 20/20, the single exception having 20/20 O.D. and 20/40 O.S. There seemed to be no relationship among the 17 in regard to

the type of refractive correction needed, except that none were myopic. Some had simple hyperopia; others had variable types of astigmatism. One of the group required a short period of supervised orthoptics, in addition to his lens correction, to remedy a moderate amount of excessive exophoria. Upon rescreening after this treatment, he was able to pass the depth check. Age did not seem to have any significant relationship to failure on the depth check. The average age was 38 years only because there is little turnover in personnel among this particular group, with the natural consequence that the same group tends to be on the same job for a number of years.

SUMMARY AND CONCLUSIONS

The visual skill of depth perception can hardly be overstressed, and it is of paramount importance to include a depth check in any visual screening routine. Otherwise, the screening cannot be considered all-inclusive for evaluation purposes. This is illustrated by the finding of 17 men, among about 400 examined, who would be considered acceptable in any visual screening check were it not for their inability to exhibit a passable performance in depth perception. It appears important in the light of this experience that refractionists give careful consideration to any refractive error, no matter how small, as being a potential factor in causing a substantial decrease in visual efficiency.

GLAUCOMA PREVALENCE

"The National Society for the Prevention of Blindness estimates that approximately one million Americans have undiagnosed chronic simple glaucoma and states that every general practitioner should assume that one in 50 of his patients who are over 40 years of age probably has this disease." Early detection and treatment result in a favorable prognosis.

—EDITORIAL
Journal of Medical Education
p. 413, July 1955

Malignant Palatal Lymphoma Involving the Periodontium

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C. JULES ROMINGER, *M. D.*
WILLIAM D. SWANCUTT, *M. D.*

THE radiosensitivity of localized lesions in malignant lymphoma is well known. However, if there has been spread of the lesion to adjacent structures, usually some distant metastasis also exists and the benefits of local therapy are but short-lived.

The following case is of interest because the local involvement was marked, but there is no evidence of generalized disease or local recurrence 2½ years after irradiation therapy.

CASE REPORT

A 26-year-old man was returned from overseas with an ulcerating tumor of the oronasal structures, centering in the palate, which had been diagnosed as malignant lymphoma by biopsy.

History. Frequent episodes of acute nasal obstruction and sinusitis had occurred since the patient was 12 years old. There had been a sudden onset of left-sided earache and tinnitus 10 months before admission. The maxillary sinuses had been irrigated three months before, producing much purulent, foul-smelling material. Shortly afterwards, pain and swelling began in the roof of the mouth, and an ulcer appeared in the soft palate. The patient was hospitalized and treated with antibiotics. The swelling and ulcer continued to enlarge, and biopsies were obtained on separate occasions from the margin of the ulcer, the nasopharynx, and the tip of the inferior turbinate. Pending the results of the biopsies, cortisone and corticotropin (ACTH) were employed but without effect. A report of malignant lymphoma was obtained, and the patient was transferred from the overseas hospital to the zone of interior.

The transfer was completed on 5 October 1953. In the preceding few days, the patient had noted a rapid increase in the size of the ulcer, the swelling of the soft palate, and symptoms of nasal obstruction. In the preceding three months, there had been a 25-lb weight loss, which he attributed to an inability to masticate and a loss of appetite because of the foul-smelling oral ulcer.

From Madigan Army Hospital, Tacoma, Wash.

Examination. The patient appeared chronically ill. A tumor mass occluded the nasopharynx and partially occluded the oropharynx so that respiration by mouth was slightly labored. The tumor mass measured approximately 9 by 5 cm, and a central area of ulceration measured 5 by 2 cm. The lesion involved the entire hard and soft palate (figs. 1 and 2). The uvula was enlarged to twice its normal size. There was

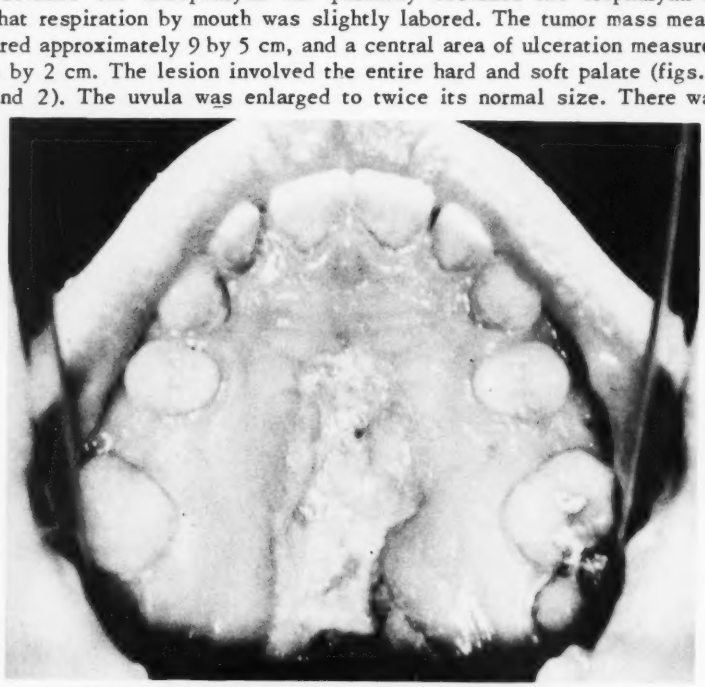

Figure 1. Anterior portion of ulcerative lesion, hard palate.

Figure 2. Posterior portion of ulcerative lesion, soft palate and oral pharynx.

tumorous extension to the left tonsil and the upper pole of the right tonsil. A communication through the necrotic ulcer between the mouth and the floor of the right nasal cavity could be demonstrated by probe. All maxillary teeth were slightly mobile, although the marginal gingivae were at normal levels and the epithelial attachments had not receded. Nodes were palpable and tender deep to the mandibular angles bilaterally.

Radiographs showed destruction of the medial portion of the hard palate, opacity of the maxillary sinuses, and a polyp in the right frontal sinus.

Radiographs of the chest were normal, and the rest of the physical examination was not significant.

Treatment. The patient was presented to the hospital's tumor board. Irradiation therapy after extraction of the maxillary teeth was recommended.

Under general anesthesia on 6 October, a biopsy specimen was obtained from the edge of the palatal ulcer, and the dental extractions were accomplished. Although no attempt was made to include surrounding blocks of the maxillary bone in the routine forceps removal of the teeth, spongy white material which contained bony spicules clung to the apical half of each tooth as it was removed. An alveolectomy sufficiently extensive to permit approximation of the mucoperiosteal edges across the sockets was performed as a protective measure against the effects of irradiation.

Microscopically, the biopsy specimen from the palate (fig. 3) showed masses of atypical lymphocytes within the intratrabecular areas of cancellous bone. These lymphocytes presented a monotonous uniformity. There were no giant reticulo-endothelial cells. There was erosion of bone. A few fat cells were seen, but most of the fatty tissue was obliterated by the infiltrating tumor cells. A diagnosis of lymphosarcoma was made.

One of the extracted teeth with attached tissue was decalcified and sectioned. There was a diffuse infiltration of atypical lymphocytes in the tissue adjacent to the tooth root (fig. 4). Fragments of alveolar bone showed compression and erosion. Erosion of the cementum was seen in one area.

Irradiation therapy was accomplished between 7 October and 18 November, using the following factors: 200 kv, 20 ma, 50 cm target skin distance, Thoraeus filter half-value layer 1.95 mm Cu. Multiple portals were employed which encompassed the entire nasopharynx, all of the paranasal sinuses, and the lymph nodes in the upper cervical regions (fig. 5). A tumor dose of 3,000 roentgens was administered to all of these regions. Following this, additional treatment was delivered to residual tumor in the palate using a peroral lead cone and the following factors: 200 kv, 20 ma, 40 cm target skin distance, 0.5 mm plus

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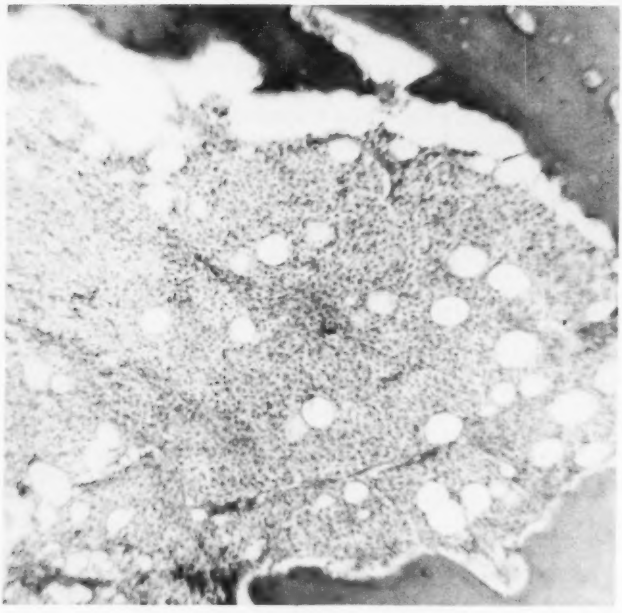

Figure 3. Microscopic section from hard palate showing atypical lymphocytes and bone erosion. (× 100)

1.0 mm Al filter half-value layer 0.9 mm Cu, 1,500 r (in air). This raised the total tumor dose in the palate to 4,500 roentgens.

The patient tolerated this course of treatment well. The eyes and the oral commissures were protected by 4 mm of lead during the treatments. A second-degree erythema developed externally (fig. 6), and an ulcerative reaction developed in the palate. As the tumor regressed, there was a residual oronasal fistula at the junction of the hard and soft palate (fig. 7). By 14 December, all reactions had healed. There were no enlarged lymph nodes in the neck, and there was no evidence of residual neoplasia. The patient had gained 20 pounds during the treatment, and his general condition was good.

Course. A maxillary denture was constructed, which also served as a temporary obturator for the oronasal fistula. The patient was given a physical disability discharge from the Army in April 1954 and subsequently observed at a Veterans Administration hospital at regular intervals.

Except for a chronic postnasal discharge there were no positive findings until January 1955, when radiographs disclosed a possible mass in the left maxillary sinus. A Caldwell-Luc procedure was performed on 21 January. The maxillary sinus was found to be free of masses. Multiple biopsies were performed, which revealed chronic

Figure 4. Microscopic section, area of tooth root apex, showing replacement of normal periodontium by atypical lymphocytes and possible destruction of cementum in one area. (× 100)

Figure 5. Outline of external portals for radiation therapy. Figure 6. Second degree erythema following radiation therapy.

Figure 7. Palate six weeks after beginning radiation therapy, showing regression of tumor and residual oronasal fistula.

sinusitis but no evidence of recurrence of malignancy. Following this operation, an oroantral fistula developed. After one unsuccessful attempt at closure, the fistula was surgically closed in December. No recurrent malignancy was noted in either procedure.

In March 1956, a routine follow-up examination was again negative for recurrent malignancy. Examination at regular intervals will continue.

COMMENT

The lymphatics of the palate and the nasopharynx are the possible sites of origin in many reported cases of malignant lymphoma, and frequently there is a history of prolonged paranasal infection. When bone is involved in lymphosarcoma, such involvement is indicative of spreading rather than early disease.

In this case, the spread of disease was manifested by the perforation of the hard palate, loosening of teeth after replacement of the normal periodontium by tumor, fixation of the soft palate, fixation of the tonsils, enlargement of the upper cervical nodes, occlusion of the nasopharynx by a mass, and radiographic evidence of paranasal sinus involvement. Considering this regional spread and the nature of lymphosarcoma, a modified program of therapy directed at relief of symptoms was considered but rejected in favor of the attempt at curative therapy. The apparent absence of local recurrence or generalized disease after 2½ years is encouraging.

Volkmann's Contracture of the Lower Extremity

A Complication of Patellar Tendon Transplantation

WALTER R. MILLER, *Captain, MC, USN*

WHENEVER an untoward incident occurs during a surgical procedure, there is an understandable reticence on the part of the surgeon to publish the case. If such information is given proper dissemination, however, it may assist in the recognition of premonitory signs in other patients, and possibly in the amelioration of residual damage. The following is such a case.

CASE REPORT

A 17-year-old girl student, seen as an outpatient, complained of falling several times a week because of bilaterally dislocating patellas. This had been occurring for a number of years, but recently had become more frequent and, in view of her age, more embarrassing. Examination corroborated the diagnosis. The left patella could be completely dislocated off the lateral femoral condyle when the knee was in approximately 40° of flexion. The right patella could be subluxed only. Roentgenograms confirmed the suspicion that both lateral condyles were lower in profile than normal.

Transplantation of a bone block including the left patellar insertion was performed on 28 February 1952. The block was moved medially and slightly distally, and secured with a stainless steel screw. The usual freeing of the lateral aspect of the extensor mechanism was done, and followed by reefing along its medial border. In spite of having been dislocated frequently, the patella, although somewhat smaller than normal, presented an articular surface covered with normal, glistening cartilage. It rode in an accessory groove in the lateral condyle completely apart from the intercondylar notch. The medial femoral condyle was hardly recognizable as such. It was deformed and although it was partially covered with cartilage, the cartilage was covered with synovial membrane.

The completely uneventful procedure, which required 1 hour and 10 minutes from initial incision to skin closure, was accomplished under spinal anesthesia and with a pneumatic tourniquet of the Campbell-

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Boyd type inflated to 480. The tourniquet was applied to the thigh but not inflated until after preparation of the skin, and spiral application of an Esmarch rubber bandage. Thus the tourniquet pressure began not more than five minutes prior to the incision. Following the operation, a long leg cast was applied over ample sterile sheet wadding, after which the tourniquet was deflated and removed. Total tourniquet time was slightly less than 1 hour and 30 minutes. Good color and warmth returned to the toes immediately. The patient was taken to the ward in good condition and the casted leg was elevated on several pillows. About eight hours postoperatively, the surgeon was called by the surgical watch officer, who stated that the patient was having some pain in the leg but that the color and temperature of the toes were satisfactory. The surgeon recommended that the cast be split and spread slightly. There were no more phone calls that night, and it was believed that all was satisfactory.

The following morning at 1000 the patient was writhing with pain, although her operated leg from which the cast had been completely removed appeared essentially normal. Color of the leg and foot was good, and the temperature was equal to that of the other leg. Capillary return time in the toes was good, but neither posterior tibial nor dorsalis pedis pulsations could be felt and no oscillations were obtained by oscillometer except above midthigh, where they were normal. The calf muscles were firm and somewhat tender, and the foot was in moderate equinus. The foot could not be dorsiflexed even to neutral, and much discomfort was caused by the attempt. The patient was quite clear in stating that her severe pain was in the entire leg from the site of the tourniquet distally. The tourniquet site in midthigh was very tender, more so than any other area.

Hypesthesia to anesthesia started 4 inches below the knee joint over the lateral aspect of the leg and about 8 inches below the knee joint on the medial side, the two areas joining anteriorly about 7 inches above the ankle joint. The skin over the calf and foot was almost completely anesthetic.

Consultation with the neurosurgeon and the anesthetist resulted in the use of continuous caudal block with Pontocaine (brand of tetracaine hydrochloride). This promptly relieved pain and caused the leg to be somewhat warmer than the unoperated leg. The patient also volunteered: "The leg feels like it's mine now down to just above the ankle." An oxygen tent used only for cooling was placed over the leg and the temperature maintained between 75° and 80°F.

On the following day consultation among the chiefs of the orthopedic surgical, general surgical, and neurosurgical services and two civilian consultants (neurosurgery and orthopedics) resulted in recommendation for lumbar sympathectomy. Following this procedure the leg was cradled in cotton in balanced suspension. The operative incision was unremarkable. The leg, including the heel, was warm, but the foot remained cool and pulseless although capillary return was adequate. Pain was reduced to moderate discomfort.

On about the third day, the calf muscles had reached a maximum of almost woody hardness and the picture of Volkmann's ischemic contracture was well developed. A small, quarter-sized area of blackened skin appeared on the heel, together with a small, blistered area overlying the tendinomuscular junction of the Achilles tendon. These both disappeared during the next two weeks.

In spite of gentle but persistent physiotherapy, followed later by a low leg brace with dorsiflexing foot spring, the foot over the next three months assumed a position of equinovarus of moderate severity (30° of equinus). The operative wound healed without event. The patient could do a straight-leg raise with the knee locked in full extension in 4½ weeks postoperatively, and the patella was felt to ride medially in a normal position. Six months following operation she had a full range of motion in the operated knee, without effusion. The foot could be voluntarily dorsiflexed to about 20° below neutral and everted to neutral. There was gross tightness and some residual induration in the posterior calf muscles; however, there was evidence of slight return of function in these. The level of hypesthesia had moved distally at least 5 inches, but the entire foot was still anesthetic. Physiotherapy, including heel cord stretching, was continued and the patient was wearing a brace part time while waiting until surgical correction of the foot deformity would be indicated.

DISCUSSION

The contracture I have described followed a relatively simple orthopedic operation on the anterior aspect of the leg performed under a properly applied pneumatic tourniquet. Search of the English literature revealed no other case of Volkmann's contracture of the leg following operation on the lower extremity, aside from a number of cases occurring as a complication of fracture of the femur. The condition is mentioned as a possibility by several authors while discussing the problem in the upper extremity.

To review in retrospect the situation as it confronted the operator at 10 o'clock on the morning following the operation, it was clear that splitting of the cast had not relieved the patient. Although she had required only two hypodermic injections of 10 mg of morphine and 60 mg of codeine during the first 20 hours postoperatively, she had complained of severe pain in the leg and of numbness in the foot and toes to such an extent that the entire cast had been removed in the early hours of the morning. At this time, according to the nurse's notes, "the toes and instep were blotched and blue." These were premonitory signs that could have been recognized and reported to the responsible surgeon. Whether earlier application of methods to reduce vascular spasm would have been effective in averting the residual damage will remain unknown, but it seems likely.

Much difference of opinion exists concerning when to explore the vessels in this condition. It was the opinion of those consulted in this case that since no trauma other than broadly distributed pressure from a pneumatic tourniquet had been inflicted on neurovascular structures, adequate blocking of the sympathetic outflow would be as effective or more so than operation in relieving vascular spasm. This view is supported by the report of Thomson and Mahoney[1] who state: "It seems significant that of all cases treated with sympathetic block (spinal anesthesia) only one was a failure and six were cured—muscle decompression with or without arterial exploration has proved to be of no value."

The opinion of Myerding[2] is of significance in cases that may become the subject for litigation: "Volkmann's ischemic contracture may result from injury when bandages, splints or casts of plaster of paris have not been used; this is a highly important fact, from a medicolegal point of view . . . . I should like to emphasize again the great importance of the fact that Volkmann's ischemic contracture may result when there is no fracture and when no splint, bandage or cast has been applied."

SUMMARY

A case of Volkmann's contracture of the lower extremity following a relatively simple orthopedic procedure is presented. No report of a similar case could be found on search of the English literature. Early recognition of premonitory signs and symptoms of this complication is of the greatest importance, so that early treatment can be instituted and residual damage be reduced to a minimum.

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"Internal medicine is the most popular medical specialty in the Army with surgery as a close second. Seventeen per cent of the 681 medical officers, both Regular Army and Reserve, holding specialty certification are diplomates in internal medicine. About fifteen per cent are in the surgical group. The remaining 68 per cent is distributed among 23 specialties and subspecialties."

—Technical Liaison Office,
Department of the Army,
Office of the Surgeon General,
Information Release of 19 July 1956

Situs Inversus of Gastro-intestinal Tract

Complication by Partial High Intestinal Obstruction

RICHARD R. PICHEL WARNER, *Captain, USAF (MC)*

TRANSPOSITION of the stomach alone, or with situs inversus of all the infradiaphragmatic viscera, is ordinarily asymptomatic although sometimes associated with eventration of the right diaphragm.[1] Situs inversus of the intra-abdominal organs occurs once in every 6,000 to 8,000 individuals[2] and is more common than partial transposition or incomplete rotation of a portion of the gastro-intestinal tract. The latter condition, however, frequently produces symptoms, and the majority of such patients are brought to medical attention during early infancy. Occasionally an individual who has symptoms resulting from anomalous rotation of a portion of the gastro-intestinal tract will not seek medical attention until early adulthood because his symptoms may have been mild, although chronic. Only in recent years has it been appreciated that such congenital anomalies need not produce clinical manifestations until early adult life.[3,4] Since the majority of military personnel are in this age category, the military physician should be acquainted with the symptoms and realize that such conditions may occur in young adults, and are not exclusively confined to infants and children.

EMBRYOLOGY

In order to understand the genesis of the group of conditions resulting from faulty rotation of the gastro-intestinal tract, it is necessary to have an understanding of the main features of the process whereby the gastro-intestinal tract attains its final asymmetrical arrangement.[3-5]

The digestive tract of the embryo is divided into a foregut, midgut, and hindgut. The midgut extends from the third portion of the duodenum to the midtransverse colon. Distal to this area is hindgut, and proximal to it is foregut.

At the fourth week of fetal life, the primitive gut hangs in the midline supported by a common dorsal mesentery. A fusiform dilatation, the future stomach, appears, and just below this the liver diverticulum and the bud that gives rise to the pancreas develop. The primitive stomach becomes further dilated so that

From 3750th U. S. Air Force Hospital, Wichita Falls, Tex.

its right surface is directed backward with the greater curvature facing downward and to the left. Due to this rotation, the liver and pancreas are carried from the midline to their respective final positions. If the stomach and descending portion of the duodenum rotate to just the opposite position from that described, the liver, pancreas, and spleen will then be carried along and be situated in such a way that they present a mirror image of their normal positioning; *i. e.*, situs inversus.

While the development and rotation of these portions and growths from the foregut are occurring, development and migration of the midgut is also underway. The midgut is divided into a prearterial portion, which extends from the third portion of the duodenum to the vitelline duct, and the postarterial portion, which extends from the vitelline duct (or Meckel's diverticulum) to the midtransverse colon. Between the sixth and tenth weeks the gut grows too rapidly for the celomic cavity to accommodate it. This results in the protrusion of a part of the midgut into the base of the umbilical cord (fig. 1A). By the tenth week, however, the peritoneal cavity becomes large enough to contain this portion of the midgut, and it is withdrawn from the base of the umbilical cord. As it enters the abdomen, it rotates in a counterclockwise direction so that the postarterial portion of the midgut (the segment from vitelline duct to midtransverse colon) is situated in the left side of the abdomen. This anticlockwise rotation continues after the midgut is entirely within the abdomen so that the cecum, which initially is in the left midabdomen, migrates to the left epigastrium and thence to the right epigastrium (fig. 1B), and finally swings around to its adult position in the right lower quadrant. The cecum and ascending colon then acquire their peritoneal reflections and attachments in the right side of the abdomen. At the same time, the small bowel, which also has been rotated in a counterclockwise direction, becomes firmly attached to the posterior abdominal wall by its mesentery.

Various factors bring about this 270° counterclockwise rotation around the axis of the superior mesenteric artery. One of the most important is the large right lobe of the liver which forces much of the midgut to the left as it recedes into the abdomen from the base of the umbilicus at about the 10th week. When the liver and other intra-abdominal structures arising from the foregut are situated in mirror image position from the normal, there is a tendency for most of the midgut to be pushed to the right as it enters the abdomen, and its subsequent migration may therefore follow a clockwise course so as to result in a mirror image position of all those portions of the gastro-intestinal tract arising from the midgut—hence, keeping the picture of situs inversus. However, even with transposition of the intra-abdominal structures derived from the foregut, this type of anomalous rotation of the

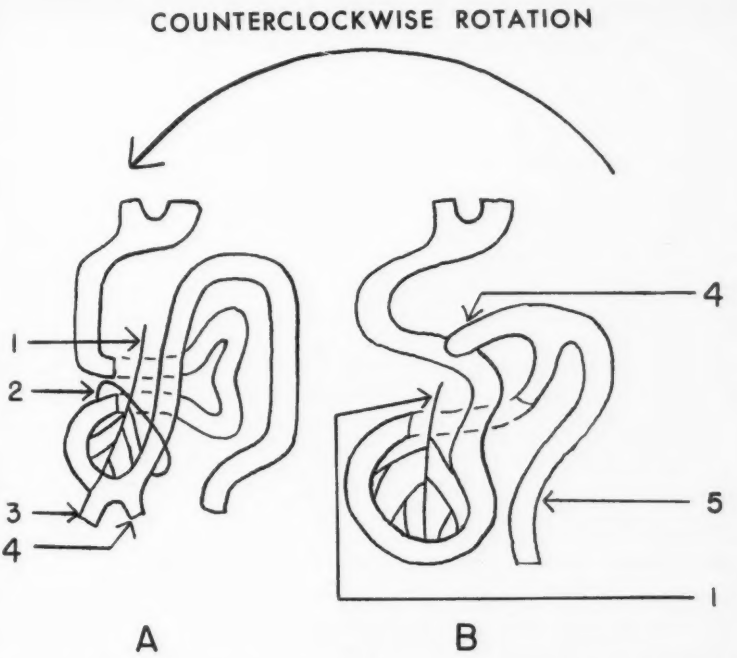

Figure 1. Embryology. (A) *Protrusion of a portion of the midgut into the base of the umbilical cord at 6 to 10 weeks' stage of development.* (B) *Midgut has re-entered abdomen at 10 to 12 weeks' stage of development and has undergone partial counterclockwise rotation so that cecum lies in right upper quadrant. This rotation will normally continue and will carry the cecum to the right lower quadrant, its final position.*

1=Superior mesenteric artery
2=Umbilical orifice
3=Vitelline duct
4=Cecum
5=Descending colon

midgut may not occur. Most of the midgut, and particularly the postarterial portion, may still go to the left side of the peritoneal cavity upon entering the abdomen, but then the process of counterclockwise rotation may not go to completion, perhaps because of the large liver mass located in the left upper quadrant. This may then result in the cecum and most of the colon being located in the left side of the abdomen; the cecum may be mobile, and there may also be nonfusion of the mesentery of the midgut so that the small bowel hangs on a pedicle of the superior mesenteric artery.

Therefore, three types of abnormalities may occur to the midgut in association with or without situs inversus of the stomach and liver: (1) return of the midgut to the abdomen without any rotation;

(2) return of the midgut with clockwise rotation; and (3) return of the midgut with incomplete or arrested rotation in the normal counterclockwise direction.

The complete failure of rotation is infrequent[4] and may not cause symptoms. Roentgenographic studies in these cases will show the entire colon in the left side of the abdomen, while the small bowel is on the right.

Clockwise rotation is rare and, when encountered, consists of the transverse colon being situated posterior to the superior mesenteric artery and the duodenum anterior to the artery.

The most common anomaly of rotation is an incomplete or arrested (counterclockwise-normal) rotation. This may result in: (1) incompletely rotated cecum; (2) lack of attachment of the mesentery along the posterior abdominal wall; and (3) a completely rotated cecum which is mobile and unattached.

With incompletely rotated cecum, bands of reflected peritoneum often run from it to the posterior lateral abdominal wall. In so doing, these bands cross the descending duodenum, which they may obstruct by external pressure. Occasionally, the cecum itself will be situated immediately over the duodenum and cause obstruction by external pressure. Often in association with the incompletely rotated cecum, the small intestine will lack proper fixation by its mesentery and will hang on a pedicle about the superior mesenteric artery; it may then twist in a clockwise direction about this pedicle, producing a volvulus of the entire midgut. The obstruction in this case is at the duodenal-jejunal junction and may be accompanied by infarction of the entire midgut, due to occlusion of the superior mesenteric artery by torsion.

A mobile and unattached cecum in itself is harmless, but when this condition is present it is often accompanied by an unattached mesentery, which presents the threat of volvulus and infarction.

SIGNS AND SYMPTOMS

A thorough and detailed discussion of signs and symptoms in these conditions may be found elsewhere.[3,4,6] In brief, they are as follows:

In infants there are evidences of high intestinal obstruction (vomiting; abdominal distention and eventually fever; dehydration; and small, infrequent stools). Dehydration may cause a slight leukocytosis, but a marked leukocytosis would suggest volvulus and infarction. Occasionally, in a young child, the clinical picture may simulate celiac disease. In older children, it may appear as recurrent and chronic abdominal pain, nausea, and vomiting. In come cases, these symptoms may be only mild until a very severe attack, often a volvulus, brings the patient for

urgent medical attention. This type of picture, with or without the severe attack, is most apt to be encountered in adults. When done properly and with caution, roentgenographic study will usually confirm the diagnosis and indicate the particular anomaly present.

TREATMENT

When the symptoms mentioned are present, surgical remedy of the condition is indicated, even though the patient may never have had a truly critical attack of abdominal pain or vomiting. In the past, the results of operation for these conditions have not been favorable, but in recent years, with the improvement of preoperative treatment and anesthesia and a better understanding of the pathogenesis of these anomalies, results have improved markedly.[3,4] Obviously the hazard of operation is much greater in infants than in older children and adults. Details of the proper operative technics are beyond the scope of this article and are available from a number of sources.[3,4]

CASE REPORT

The following case demonstrates several of the anomalies of gut rotation described and provides an example of a satisfactory surgical cure:

On 9 April 1955, a 22-year-old white Airman third class, was admitted to this hospital because of 10 days of epigastric discomfort, recurrent vomiting, questionable hematemesis on one occasion, and syncope on several occasions. He had been on active military service throughout the preceding 41 months. Investigation of his past history disclosed that he had been free of gastro-intestinal symptoms during his childhood, but in 1952 noted the onset of approximately monthly episodes of moderately severe, aching midepigastric pain associated with anorexia and nausea. The pain was unrelieved by eating or drinking; in fact, consumption of food or liquid would aggravate his pain and produce vomiting, following which he noted relief. Infrequently he vomited when he had no epigastric pain. Because of anorexia, and because intake of food or liquid would exacerbate pain and vomiting, he would voluntarily limit himself to a very scanty diet for a three- or four-day period during these episodes. Toward the end of these periods he usually noted increasing weakness, and then, often following vomiting or defecation, he would experience syncope.

He was hospitalized in 1952 and again in 1953 because of these symptoms. On both occasions, roentgenographic studies of his gastrointestinal tract disclosed situs inversus of his abdominal viscera. No peptic ulcer or other lesion was found. For several months in 1953 he was treated with a bland, ulcer-type diet and tincture of belladonna. He noted some improvement in his symptoms during this time.

Physical Examination. On admission, the patient appeared to be a slightly gaunt, mildly ill, well-developed white male. He was 6 feet

2 inches in height and weighed 170 pounds. His usual weight had been 195 pounds. Vital signs were normal. Hydration was only fair. There was a prominent sternum and a slight pigeon-breast type of sternal deformity. The remainder of the physical examination disclosed no significant abnormalities.

Laboratory Findings. Peripheral blood studies at the time of admission revealed a red blood cell count of 3.7 million per μl; hemoglobin was 11 g per 100 ml; hematocrit, 52.5 ml per 100 ml; reticulocyte count, 1.1 per cent; and white blood cell count, 13,400 per μl with a slight shift to the left. The stool contained traces of occult blood. Urinalysis showed no abnormalities. Determinations of the fasting blood sugar, serum chlorides, and basal metabolic rate all yielded values within normal limits. The gastric contents after fasting contained 65° of free acid, and after histamine, 90° were present. An electrocardiogram showed no significant abnormalities. A roentgenogram of the chest was normal. The heart was in its normal position on the left. No defects in the diaphragms were noted. An upper gastro-intestinal series demonstrated situs inversus of the abdominal organs and an anomalous course of the duodenum. There was spasm of the pylorus and the duodenal bulb could not be well outlined. No deformity or ulcer crater could be seen. Several more upper gastro-intestinal series and roentgenograms of the small bowel were taken with the intent of studying the anomalous duodenum in detail. Barium was introduced by Levin tube in one of these studies. The duodenal bulb was well visualized and showed no deformity or ulceration. The anomalous course of the duodenum was well demonstrated (fig. 2), and considerable dilatation of the bulb and first portion of the duodenum was seen. A point of obstruction was visualized low in the descending limb of the duodenum (fig. 3). At this point, the transverse mucosal folds were converted into vertical striations. There was delayed passage of barium past this point. The picture was felt to represent partial obstruction due to extrinsic pressure as might be caused by a mesenteric band. Beyond this area, there was a reversed loop of the duodenum before it passed into the proximal jejunum, which went high and posteriorly on the right side of the abdomen. The cecum was low on the left side of the abdomen. A congenital anomaly of the lumbar spine consisting of failure of segmentation of L5 and S1 was present. An intravenous pyelogram showed two normal kidneys and ureters.

Course in Hospital. The patient was initially maintained on a nutritious liquid diet and antacids. After two weeks, symptoms of obstruction disappeared and he was allowed a more nearly regular diet. His work-up was completed, and on 9 June 1955 he was operated on.*

At operation, as seen on the roentgenograms, his abdominal viscera were completely transposed from left to right in a mirror image of the normal arrangement. The cecum was completely mobile and the small

*Operation was performed by Capt. Gilbert L. Chamberlin, USAF (MC).

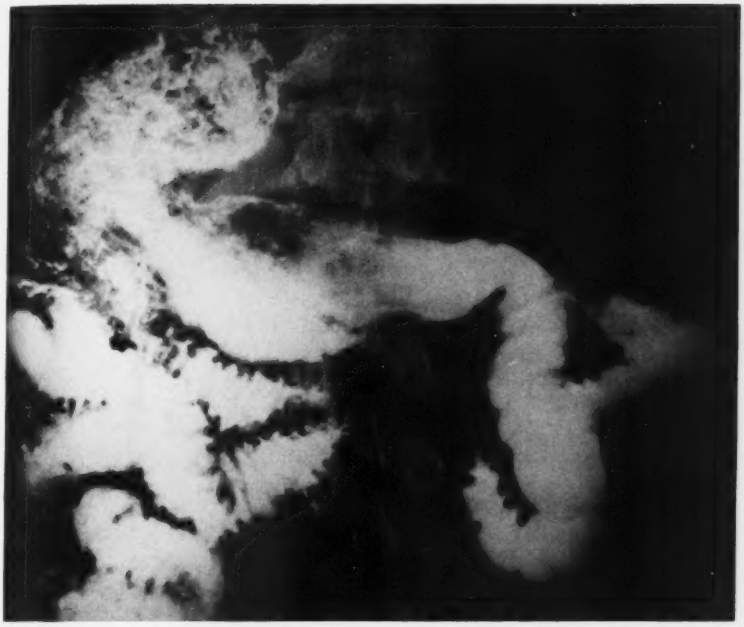

Figure 2. Roentgenogram demonstrating situs inversus of the stomach and anomalous course of duodenum.

intestine's mesentery was attached to the posterior abdominal wall for only eight centimeters. The appendix contained several fecaliths. The jejunum and ileum were normal as was the ligament of Treitz. The duodenum was elongated to about 15 inches and was enveloped in peritoneal folds, which at the most dependent portion of the duodenum had kinked this loop of gut in a sharp 180° angle. This point of sharply angulated gut was just below the attachment of the duodenum to the pancreas. From this point, the duodenum crossed itself, ran laterally upward and back across itself again, and then posteriorly to the superior mesenteric artery to reach the ligament of Treitz. Two normal kidneys were present, but a right retroperitoneal mass was noted and proved to be an accessory kidney. The duodenum was mobilized and its kinked dependent portion was straightened out by freeing it from the enveloping mesenteric folds. It was felt that this would be sufficient to relieve the patient's symptoms of recurrent partial intestinal obstruction. The appendix was also removed.

Postoperatively, the patient's convalescence was entirely uneventful, and three weeks after surgery he was returned to duty. When seen three months later, he was entirely free of gastro-intestinal symptoms and eating a regular diet.

Figure 3. Roentgenogram demonstrating considerable dilatation of the duodenal bulb and first portion of the duodenum, with point of partial obstruction in descending limb of duodenum just proximal to sharp angulation.

It was believed at the time of operation that, although incomplete, the attachment of the small intestine's mesentery to the posterior abdominal wall was sufficient to render the possibility of volvulus unlikely. Therefore, no attempt was made to immobilize the small bowel by further attaching its mesentery. The increased incidence of duodenal ulcer in association with partial obstruction at the duodenum due to congenital bands or adhesions[7] was appreciated. Hence, roentgenographic studies were meticulously performed in the search for an ulcer. Such ulcers are felt to be due in large part to stasis. Our patient may have had such an ulcer in the past or at the time of admission, and its bleeding would explain the mild anemia and occult blood in the stools found when he was hospitalized. Such an ulcer at the time of admission could have been a very superficial one and could have healed prior to operation. In such ulcer cases, since stasis is the major causative factor, the surgical relief of the duodenal obstruction is usually sufficient to result in cure.

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THE FOUR STAGES OF KNOWLEDGE

"Where are we in our efforts to understand arteriosclerosis? Well, certainly not very far. Discovery in general can, I think, be divided into four stages. The first is the period of uncoordinated fact collecting—the naturalist or "butterfly net" period. This is the period of magnificent indifference; in it lie the seeds of discovery but the inner structure is barely discernible. The second is the period of controversy—the "rhubarb stage" of the ball game. This stage is often called one of "scientific controversy" to make it sound less like the rhubarb that it really is. It has the merit that there is probably something worth arguing about if this stage is reached. It is healthy so long as young investigators understand its nature and not take it, or themselves, too seriously. The third is the period of definition and clarification—the "white of an egg stage" because someone clarifies the problem by precipitating the irrelevant sediment. The fourth and last is the period of solution or fruition—the "bravo stage" in which everyone, or nearly everyone, agrees, applauds and goes home and from then on nobody does much more about it, except in some rare cases, collects royalties.

"I think you will agree that research in arteriosclerosis stands about half way between the first and second stages."

—IRVINE H. PAGE
in *Minnesota Medicine*, p. 743,
Nov. 1955

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Departments

A MESSAGE FROM THE A. M. A.

A recently published letter from an anonymous captain received wide circulation among military personnel. The correspondent attempted to establish that the basic cause of the acute shortage of doctors in the armed services is that there are simply not enough available physicians in this country. To support his opinion, the captain accused the American Medical Association of limiting the number of medical schools as well as the number of licensed physicians. Specifically, he charged that (1) the A. M. A. began a policy 50 years ago of closing down medical schools; (2) only 1 out of every 10 or 20 applicants is admitted to a medical school; and (3) the A. M. A. started a policy of refusing to permit Americans who are graduates of European medical schools to take state medical board examinations.

Statements like this are not new, and unfortunately they have been repeatedly made in public print. Are they fact or fiction? Well, let's examine the record and see.

As to the first charge, *the American Medical Association has never closed any medical school.* In fact, it has neither the authority nor the desire to control the growth of medical schools. Some 56 years ago, a report on the unsavory quality of medical education in the United States was published as a result of a study spearheaded by Dr. Abraham Flexner. The report clearly revealed that only about one third of the schools then in existence were offering a satisfactory medical education adequate to meet the needs of that period. The report shocked reputable medical educators, and their actions brought speedy results. A vigorous house cleaning ultimately wiped out about two hundred fly-by-night schools which were either diploma mills or had facilities, personnel, or financing inadequate to offer a medical education suitable for that period. From 1910 until about 1928, medical schools were classified as A, B, or C in terms of their over-all potentialities; B or C schools either improved or closed their doors. This type of classification was discontinued in 1928, and since that time medical schools have been approved or not approved.

The American Medical Association Council on Medical Education and Hospitals has worked closely with the Association of American Medical Colleges in constant efforts to assist in developing and maintaining sound standards of medical education

From the Council on National Defense of the American Medical Association. The views and opinions expressed are not necessarily those of the Department of Defense.—*Editor.*

in the United States in the interests of the American public, which the graduates of our medical schools must serve. These two organizations have exerted great influence in medical education. They have co-operated in stimulating and encouraging new medical schools, and have assisted in the improvement of those in existence by establishing sound, basic essentials of medical education, as well as by consultations, advice, and survey evaluation.

The number of approved medical schools in the United States increased from 66 in 1910 to 81 in 1955, a growth of 22.7 per cent. On the basis of new schools now under development, the number will have increased 30 per cent by 1960. In 1955, there were 28,583 students enrolled in medical schools as compared with 12,530 in 1910. The number of physicians graduated from approved medical schools since 1910 has far outstripped the growth of the over-all population of the United States. While our general population was increasing 80 per cent, the supply of doctors increased 120 per cent. Today, we have not only more doctors, but far better care than a generation or two ago. Physicians now treat a great many more patients and treat them more efficiently.

The second charge is likewise incorrect and not supported by the facts. Simple arithmetic establishes that *over half of all applicants were accepted into medical schools in 1953-1954 and in succeeding years.* The exact ratio of admissions to the number of applicants for 1953-1954 was 1 to 1.97, or 7,749 admissions out of a total of 14,678 applicants; for 1954-1955 it was 1 to 1.93, or 7,556 admissions out of a total of 14,538 applicants. Several years ago, publicity was given to the number of applications filed rather than to the total number of applicants filing them. This was incorrectly interpreted to mean that only 1 out of every 10 or 20 applicants is admitted to a medical school. The fact is that each applicant usually applies to some 2 to 4 or 5 medical schools. This means, of course, that the number of applications filed represents many times the number of people who are actually applying for admission to a medical school. For example, in 1953-1954 there were 48,556 applications for admission to medical schools, made by 14,678 individuals. Each applicant filed an average of 3.3 applications. Even at the peak period of admission to medical schools in 1948-1949, when large numbers of young men were being released from military service, the ratio of applicants to admissions was never higher than 3.6 to 1.

The third charge is a fallacy. By state statutes, it is the function and authority of the individual states to determine who shall practice within their borders, and to maintain high standards of medical practice in accordance with their respective rules and

regulations. The State Boards of Medical Examiners are independent agencies, and *the licensing in each state is done on the basis of the individual medical practice acts of the states concerned and the determinations of the various individual licensing bodies*. There are 20 medical licensing boards that permit licensure of foreign-trained physicians. On the other hand, foreign-trained physicians are not eligible for licensure by 12 boards. Special requirements for foreign-trained physicians are specified by 18 boards, while 16 boards have varying exemptions. In the final analysis, medical licensure in the United States is a "sovereign state right" that is entirely under the jurisdiction of the governments of the individual states.

The captain's suggestion for the creation of a medical academy to produce medical officers for the Armed Forces is not new. This idea has been carefully considered for a number of years by Congress, the military services, the medical profession, and groups of medical educators. All who have looked into the problem agree that, if the services are to produce their own physicians, it is far better and cheaper to subsidize the education of medical students in existing medical schools than for the Federal government to create, equip, and staff a separate medical academy. Furthermore, all groups agree that the present diversification in background and training of medical officers who have graduated from a number of different medical schools is a distinct advantage to military medicine.

Based on these decisions, the military services recommended legislation to the last Congress that would have permitted the subsidization of medical students under contract to become career military medical officers upon the completion of their training. This recommendation had the whole-hearted support of the medical profession.

Before Congress had completed final action on the proposal, however, the military services found it possible to establish a program of subsidizing the training of selected senior medical students in return for commitments of military service. This program is now in operation with the full support of the medical profession and medical educators. Studies are currently under way to determine the feasibility of extending this program to include junior medical students as well.

Programs of this type, together with the recently enacted career incentive bill for medical officers, should prove of great assistance in solving the basic problem.

EMINENT ARMY UROLOGIST DIES

Colonel James C. Kimbrough, MC, USA (Ret.), age 68, died on 19 August 1956 at Walter Reed Army Hospital, where he had served for the past 10 years.

From 1946 to 1953, he was chief of the hospital's Urology Service. In August 1953, upon retiring from the U. S. Army after 36 years of service, he was designated by an Act of Congress as consultant in urology to Walter Reed Army Medical Center, "... in recognition of the outstanding service and contribution made to the science of medicine and surgery... and to provide that his mature professional judgment and long experience may continue to remain available to the public service...."

A native of Madisonville, Tenn., he was graduated from Hiwassa College and from Vanderbilt University School of Medicine before entering the military medical service in July 1917. Since 1921, he served almost exclusively as chief urologist at various Army hospitals, including four duty tours at Walter Reed. He was also Chief of the Professional Services Division in the Office of the Chief Surgeon, European Theater of Operations, from 1942 to 1945.

In World War I, Colonel Kimbrough received the Purple Heart award, and a Meritorious Service Citation signed by General of the Armies John

J. Pershing. In World War II, he was awarded the Legion of Merit and the Bronze Star Medal. In 1952, he was awarded a plaque by the American Urological Association, of which he was a member, in recognition of his "contributions to the advancement of science and practice of urology" and for his "efforts in promoting pleasant working relations between civilian and military medicine," and in 1955 he was elected president of that association's Mid-Atlantic Section, the first time in the association's history that a former Army officer had held the position. Since his death the annual postgraduate refresher course in urology at Walter Reed has been named in his honor.

FIRST INTERNATIONAL CONGRESS OF NEUROLOGICAL SCIENCES

The First International Congress of Neurological Sciences will be held in Brussels, Belgium, 21-28 July 1957. This Congress is the first integrated international convention of all independent international congresses of several neurological disciplines. Meeting simultaneously in Brussels under the new co-ordinated program are Sixth International Neurological Congress, Fourth International Congress of Electroencephalography and Clinical Neurophysiology, Third International Congress of Neuropathology, First International Congress of Neurological Surgery, Third Meeting of the International League against Epilepsy, and Second Symposium Neuroradiologicum.

The scientific program will highlight two major symposia of common interest to the Congress: Extrapyramidal Disease, by Professor Raymond Garcin of Paris, and the Significance and Interpretation of Modifications of the Conscious State, by Sir Geoffrey Jefferson of London. Special interest symposia will include Multiple Sclerosis, under the Chairmanship of Professor H. Houston Merritt of New York.

Further information may be obtained from Dr. Pearce Bailey, Secretary, Committee for the United States of the Sixth International Neurological Congress, National Institutes of Health, Bethesda 14, Md.

DEATH

ALTEE, Miriam Elizabeth, Lieutenant, NC, USN, of Columbia, S. C.; Chief Nurse at U. S. Naval Air Station, Norfolk, Va.; graduated from the Petersburg Hospital School of Nursing, Petersburg, Va., 12 August 1937; appointed, Nurse, in the U. S. Navy and ordered to active duty 6 May 1940; died 24 August 1956, age 43, at the U. S. Naval Hospital, Portsmouth, Va., of metastatic carcinoma of the vertebrae.

Promotions of Officers

The following officers of the military medical services on active duty in the Army, Navy, and Air Force have recently received temporary promotions to the rank indicated.

MEDICAL CORPS

ACKERMAN, Gustave A., Capt., USA
ADDISON, James A., Capt., USN
ADLER, Sheldon B., Capt., USA
AGUILO-DIES, Jose, Capt., USA
AISEN, Philip, Capt., USA
ALBERT, Chalom A., Capt., USA
ALDEN, Alfred M., Capt., USA
ALONSO, Cespedes T., Capt., USA
ANDERSON, Roland G., Capt., USA
ARDAM, Irwin H., Capt., USA
ASHFORD, Thomas P., Capt., USA
AZORDEGAN, A. A., Capt., USA
BAER, Robert B., Capt., USA
BAKER, John R., Capt., USA
BALLENBERGER, Loui P., Capt., USN
BARLOW, Peter P., Capt., USA
BARR, Solomon E., Capt., USA
BASSHAM, Byron E., Capt., USN
BATTAILE, William G., Capt., USA
BAZILIAN, Stanford, Capt., USA
BEGUESSE, Edwy C., Capt., USA
BEITHON, Paul J., Capt., USA
BELGRADE, Joseph E., Capt., USA
BELVILLE, Donald R., Capt., USA
BENNETT, Stephen L., Capt., USA
BERLACHER, Franz J., Capt., USA
BERNSTEIN, Eugene F., Capt., USA
BERRY, Reginald V., Capt., USN
BETHANY, Joe J., Jr., Capt., USA
BEVER, Lloyd J., Capt., USA
BIERLEY, John R., Capt., USN
BINSTOCK, William, Capt., USA
BLANCHARD, Robert E., Capt., USA
BLOCK, Alvin L., Capt., USA
BLOOM, David M., Capt., USA
BOETTGER, Hans F., Maj., USA
BOLT, Donald A., Capt., USA
BOUGHTER, Richard L., Capt., USA
BOWLBY, James R., Capt., USA
BOWLES, Richard P., Capt., USA
BOWMAN, F. O., Jr., Capt., USA
BOYD, George K., Capt., USA
BOYERS, James H., Capt., USN
BRADSHAW, Robert H., Capt., USN
BRAGMAN, Robert D., Capt., USA
BRENT, Robert L., Capt., USA
BRILL, Norman R., Capt., USA
BRODY, Sidney I., Capt., USN
BROMBERG, Philip A., Capt., USA
BROOKS, Donald L., Capt., USA
BROWN, Ralph R., Capt., USAF
BUCKLEY, James A., Capt., USA
BUNDENS, Warner D., Jr., Capt., USN
CAMBOR, Charles G., Capt., USA
CAMPBELL, Donald A., Capt., USA
CAMPBELL, Donald F., Capt., USA
CANAGA, Bruce L., Jr., Capt., USN
CANTER, Hall G., Capt., USA
CANTRELL, William C., Capt., USN
CARFFT, William M., Capt., USN
CASTEEL, Byron D., Capt., USN
CASTOR, Louis H., Capt., USA
CHANDLER, Arthur, Jr., Capt., USA
CHERVENAK, William, Capt., USA
CHRISTENSEN, Rolan A., Capt., USN
CHRISTOPH, Robert F., Capt., USN
COLEMAN, John H., Capt., USA
COLLINS, Robert D., Capt., USA
COMPTON, William A., Jr., Capt., USA
CONARD, Robert A., Capt., USN
CONNELLY, Joseph R., Capt., USN
COOK, Thomas W., Capt., USA
COOKSEY, Roy G., Jr., Capt., USAF
COOPER, Everett B., Capt., USA
COPE, Donald I., Capt., USA
COPLAN, Robert S., Capt., USA
CORBIN, Maurice C., Capt., USA
CROCKETT, Robert F., Capt., USA
CUNNINGHAM, James E., Capt., USA
CURRIER, Albert E., Capt., USA
DALBERG, S. E., Maj., USA
DAVIS, Joseph E., Capt., USA
DEGENERES, L. H., Maj., USA
DeGROOT, Henry E., Capt., USA
DELERME, Martinez F., Capt., USA
DENNIS, Joel B., Capt., USA
DeYOUNG, Jess J., Capt., USA
DIXON, George L., Jr., Capt., USA
DIXON, Leon M., Capt., USA
DODGSON, Wilfred B., Capt., USA
DOOD, Arnold R., Capt., USA
DORFMAN, Howard D., Capt., USA
DOTOLI, Franklin, Capt., USA
DOTSON, C. C., Jr., Capt., USA
DUFFNER, Gerald J., Capt., USN
DUFFY, John L., Capt., USA
DUFFY, Thomas L., Capt., USN
DUNLEAVY, James D., Capt., USA
ECHIKSON, Edward H., Capt., USA
EDMONDSON, Robert C., Capt., USA
EISENSTEIN, Reuben, Capt., USA
ELLIOTT, Edward H., Maj., USA
ELSON, Charles E., Capt., USA
ENNIS, Henry R., Capt., USN
ESHLEMAN, Silas K., Capt., USA
FALLIS, Bruce D., Capt., USA
FERNANDEZ, Manuel C., Capt., USA
FILIPOVICH, Orest F., Capt., USA
FLETCHER, Robert G., Capt., USA
FOLEY, Michael J., Capt., USA
FONTAINE, Roger J., Capt., USA
FORD, George W., Capt., USA
FOREMAN, Lee S., Capt., USAF
FRANZ, John D., Capt., USA
FRAZER, Joe W., Jr., Capt., USA
FRIEDMAN, Herbert S., Capt., USAF
FRUEHOLZ, Frederick, Capt., USA
FUJII, Tetsuro, Capt., USA
GAINES, Leonard M., Jr., Capt., USAF
GALYON, James T., Capt., USA
GANZ, Aaron, Capt., USA
GARCIA, Margarida M., Capt., USA
GARZA, Harold R., Capt., USA
GELINAS, Joseph A., Maj., USA
GERBER, Marvin L., Capt., USN
GEORGESON, Lloyd W., Capt., USA
GEYER, Charles N., Capt., USA
GOLDBERG, Arnold L., Capt., USA
GOLDBERG, Morris M., Capt., USA
GOLDSBOROUGH, John, Capt., USA
GOLDMAN, Armond S., Capt., USA
GOLDSMITH, Richard, Capt., USA

GOLDSTON, Edgar C., Capt., USA
GOSIN, Robert F., Capt., USA
GOULD, James P., Capt., USA
GOULDER, Lloyd L., Jr., Capt., USA
GRABB, William C., Capt., USAF
GRANAI, Cornelius C., Capt., USA
GRANT, John A., Capt., USA
GREEN, William L., Capt., USA
GREEN, William O., Jr., Capt., USA
GREENBERGER, Alex M., Capt., USA
GREINER, Robert A., Capt., USA
GRETEMEIER, H. L., Capt., USA
GRIFFIN, David J., Maj., USA
GRIFFITH, Reuben W., Capt., USA
GROSS, Ralph, Capt., USA
GROVER, Frederick W., Capt., USA
GUIDRY, John J., Capt., USA
GURNICK, Joseph R., Capt., USA
GUSTAFSON, John F., Capt., USA
HAAS, Adolf, Capt., USA
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HAMILTON, Robert B., Capt., USA
HAMME, Elmer G., Capt., USA
HANDEL, John W., Capt., USA
HANDLER, Joseph S., Capt., USA
HARDING, George T., Capt., USA
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HARROP, Donald E., Capt., USA
HASSAN, Donald K., Capt., USA
HAYWOOD, Theodore J., Capt., USA
HENDERSON, J. B., Jr., Capt., USA
HERMANN, Hugh P., Capt., USA
HINRICHS, Robert A., Capt., USA
HIROSE, Frank M., Capt., USA
HODGES, Robert E., Capt., USA
HOETON, Samuel H., Jr., Capt., USN
HOLLER, Moffit K., Capt., USN
HOLNESS, Herbert A., Capt., USA
HONICK, Gerald L., Capt., USA
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HORSLEY, Howard T., Capt., USA
HOWERTON, L. W., Jr., Capt., USA
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HUSTON, J. Wilson, Capt., USN
ITANO, Masashi, Capt., USA
JACOBS, David C., Capt., USA
JAHNKE, Leonard P., Capt., USN
JOHANNESSEN, John M., Capt., USA
JOHNSON, Cecil V., Capt., USA
JONES, Thomas L., Jr., Capt., USA
KAISER, Donald R., Capt., USA
KAISER, Julian S., Capt., USA
KAMIN, Edward J., II, Capt., USA
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KARR, Walter J., Capt., USA
KAY, Jacob L., Capt., USA
KAYCE, Melvin M., Capt., USA
KILGORE, Bassett B., Capt., USA
KILLORAN, Paul J., Capt., USA
KILPATRICK, W. C., Jr., Maj., USA
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KOENIG, Reuben E., Capt., USA
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KOHEN, Joseph B., Jr., Capt., USA
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KURKE, Lewis, Capt., USA
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LAWSON, William G., Capt., USN
LEATHER, Robert P., Capt., USA
LEE, Thomas C., Capt., USA
LEHR, David E., Capt., USA
LEHR, Howard H., Capt., USA
LEIGHTON, Herbert H., Capt., USA
LETSON, Robert D., Capt., USA
LeVALLEY, John, IV, Capt., USA
LEVINE, Bernard B., Capt., USA
LEVINE, Jules, Capt., USA
LEVINE, Milton L., Capt., USA
LEVINE, Sidney A., Capt., USA
LEVY, Leslie J., Capt., USA
LEVY, Robert N., Capt., USA
LICHTER, Edward A., Capt., USA
LITOWSKY, David, Capt., USA
LOCKE, William E., Capt., USA
LOCKWOOD, James H., Capt., USN
LOEB, Laurence, Capt., USA
LOWELL, Edward H., Capt., USA
LUDLOW, Enoch A., Capt., USA
LUGHRIN, Harry J., Capt., USA
LUMMIS, W. Syre, Capt., USN
LYDAY, William D., Capt., USA
MACIEJEWSKI, A. J., Capt., USA
MAFFEI, Michael J., Capt., USA
MALINER, Jerome S., Capt., USAF
MANDELBAUM, Isidore, Capt., USA
MANGANO, Joseph A., Capt., USA
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MARKS, Ansel R., Capt., USA
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McNULTY, John P., Capt., USA
McPARTLAND, Fran C., Capt., USA
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MELNICK, Gilbert S., Capt., USA
MELTZER, Jay I., Capt., USA
MENKE, Richard J., Capt., USA
MERSCH, William J., Capt., USA
MILLER, Arthur V., Capt., USN
MILLER, Wilbur H., Capt., USA
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MOYES, James K., Capt., USA
MUGLER, F. R., Jr., Capt., USA
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NORMAN, Clyde W., Capt., USN
NOVA, Phillip L., Capt., USN
O'BRIEN, Richard F., Capt., USA
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OPPENHEIMER, Jack H., Capt., USA
ORR, James M., Capt., USA
PANARO, Victor A., Capt., USA
PARKER, Malcolm R., Capt., USA
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PONTOPPIDAN, Hening, Capt., USA
POON, Cho T., Capt., USA
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PRESTON, Joseph A., Capt., USA
RABINER, Edwin L., Capt., USA
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RICHMOND, Roland W., Capt., USA
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ROUSH, William H., Capt., USA
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SCADUTO, Louis E., Capt., USA
SCANLIN, Harold R., Capt., USN
SCHARFMAN, Melvin A., Capt., USA
SCHNECK, Stuart A., Capt., USAF
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SCHULTZ, Herman J., Capt., USA
SCHULTZ, Richard C., Capt., USA
SCHULTZ, Thomas L., Capt., USA
SCHULZ, Norman H., Capt., USAF
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SELZER, Richard A., Capt., USA
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SHEEHY, Alfred M., Capt., USA
SHEPHARD, Bruce M., Capt., USN
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SNYDER, Parker W., Capt., USA
SOBEL, Melvin, Capt., USA
SPANKUS, Jack D., Capt., USAF
STARK, William A., Capt., USA
STEIN, Myron L., Capt., USA
STEINMAN, Arnold M., Capt., USA
STEUER, George Z., Capt., USA
STOLL, Howard L., Jr., Capt., USA
STOUT, Robert E., Capt., USA
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TAYLOR, James P., Capt., USA
TAYLOR, Thomas L., Capt., USA
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TERESI, Peter S., Capt., USA
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VEST, Leonard A., Capt., USA
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VOSTI, Gordon J., Capt., USA
WADLER, Marvin, Capt., USA
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WALLYN, Richard J., Capt., USA
WALTERS, Cornelius, Capt., USA
WATKINS, Franklin P., Capt., USA
WATKINS, George S., Capt., USN
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WHARTON, James D., Capt., USN
WHITE, William A., Capt., USAF
WIENER, Joseph, Capt., USA
WILHELM, Rudolf E., Capt., USA
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WITT, Frederick W., Capt., USAF
WOODINGTON, G. F., Capt., USA
WOLVERTON, William P., Capt., USA
WONG, Yep How, Capt., USA
WRIGHT, Gene E., Capt., USA
WULFMAN, William A., Capt., USN
WURZBACHER, Warren, Capt., USA

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WURZEL, Edward M., Capt., USN
YABLIN, Bernard A., Capt., USA
YTSHAR, Zwiherman, Capt., USA
ZERNE, Stanley R. M., Capt., USA
ZOLL, Daniel R., Capt., USA
ZUBRITSKY, S. A., Capt., USA

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ALBRIGHT, Ronald L., Capt., USA
BERNER, Charles R., Capt., USA
BERNEY, John R., Capt., USA
BERNSTEIN, Aron, Capt., USA
BINISKIEWICZ, J. E., Capt., USA
BORGESEN, Paul B., Capt., USA
BOSADJIEFF, Z. J., Capt., USA
BOYLAND, Colum J., Capt., USA
BRADLEY, George W., Capt., USA
BUSBY, George C., Jr., Capt., USA
CALLAHAN, John R., Capt., USA
CALMAN, Clarence M., Capt., USA
CARLINO, Leo T., Capt., USA
CARLOS, James P., Capt., USA
CARRON, Carl H., Capt., USA
CASHIN, John L., Jr., Capt., USA
CHENEY, Harold G., Jr., Capt., USA
CLINTON, Everette E., Capt., USA
COOK, Wayne, Capt., USA
CORNELL, Frank M., Capt., USA
CROWE, Patrick D., Capt., USA
DEATHERAGE, Lewis W., Capt., USA
DONALAN, Joseph V., Capt., USA
DUNFEE, Arnold, Capt., USA
DUTTON, Larry N., Capt., USA
FELDMAN, Paul, Capt., USA
FIELDUS, Britton A., Capt., USA
GARSON, Philip, Capt., USA
GIBSON, Jack T., Capt., USA
GILBERT, Harold M., Capt., USA
GILBERT, Milford, Capt., USA
GIZYNISKI, Arthur L., Capt., USA
GRAYSON, Alvin J., Capt., USA
GROGAN, William W., Capt., USA
GUARNACCIA, Gaetano, Capt., USA
GUDZIAK, Alexander, Capt., USA
HARGIS, Harold W., Capt., USA
HILLSMAN, Joe T., Capt., USA
HOFMANN, James, Capt., USA
HUTCHINSON, Gale L., Capt., USA
IMER, Jean F. O., Capt., USA
JONES, Edward C., Capt., USA
KANTERMAN, Cyril B., Capt., USA
KNOWLES, Elzy R., Capt., USA
KOZAM, George, Capt., USA
LANDRY, Frank G., Capt., USA
MADDOX, Belman C., Capt., USA
MARENCO, Dario L., Capt., USA
MAZUR, Gilbert G., Capt., USA
MIDYETTE, William, Capt., USA
MONACO, Daniel A., Capt., USA
ORR, John R., Capt., USA
PAWELEK, Claude A., Capt., USA
PICKETT, Harold G., Capt., USA
ROONEY, George A., Capt., USA
ROSS, Jeff P., Capt., USA
RUIZ, Amengual B. M., Capt., USA
SORICE, Sabby A., Capt., USA
STANESIC, John R., Capt., USA
STROUP, Jacok C., Capt., USA
THANE, John W., Capt., USA
TYLER, Robert J., Capt., USA
VEHR, John A., Capt., USA
WAGNER, Allyn G., Capt., USA
WAGNER, Thomas E., Capt., USA
WARREN, William L., Capt., USA
WEST, George R., Jr., Capt., USA
WHITE, Charles F., Capt., USA
WHITE, Manes T., Jr., Capt., USA
WHITNEY, Frank T., Jr., Capt., USA
WILLIAMS, Thomas D., Capt., USA
WILLIFORD, William, Capt., USA
WORRELL, Leroy A., Capt., USA
ZALEON, Irving, Capt., USA

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BEALE, Charles C., Capt., USAF
BEATTY, Maxine, Capt., USAF
BRADEN, Robert W., Capt., USAF
CLAY, John L., Capt., USAF
DILLS, Jerald C., Capt., USAF
DUNKERTON, Ethiel A., Capt., USAF
FREED, Robert C., Capt., USAF
GIBBS, Clifton R., Capt., USAF
GRIFFIN, Robert W., Capt., USAF
GRILLO, Gino P., Capt., USAF
HAGEN, Harold A., Capt., USAF
HENDEREN, Alice J., Capt., USAF
JACOBSON, Robert T., Capt., USAF
JONES, Bruce, Capt., USAF
KEEFFE, Loren J., Capt., USAF
KIMBLER, Archie, Capt., USAF
MURPHY, James D., Capt., USAF
PASCH, John E., Capt., USAF
POLEY, George W., Capt., USAF
SANDERS, Charles M., Capt., USAF
VANWAY, Kenneth H., Capt., USAF
WEST, Billy, Capt., USAF
WILSON, Robert R., Capt., USAF

NURSE CORPS

BATES, Maudie E., Capt., USAF
BELT, Virginia T., Capt., USAF
BILLINGHAM, June D., Capt., USAF
BOLDEN, Iona, Capt., USAF
CARLSON, Mary S., Capt., USAF
CLEMETSON, Alvira L., Capt., USAF
COMER, Rosa L., 1st Lt., USAF
FLATTERY, Gladys A., Capt., USAF
FRANCISCO, Anna M., Capt., USAF
GAINES, Julia, 1st Lt., USAF
HALEY, Lorraine M., 1st Lt., USAF
HAMMOND, Patricia A., 1st Lt., USAF
HEALY, Mary E., Capt., USAF
HENDERSON, Gertrude H., Capt., USAF
HERRICK, Helen L., Capt., USAF
JACKSON, Doris M., Capt., USAF
JOHNSON, Margaret L., Capt., USAF
McMAHON, Mary A., Capt., USAF
MILLER, Kathryn M., Capt., USAF
MUGLIA, Marianne R., Capt., USAF
NIXON, Eva C., Capt., USAF
PARRISH, Lillian H., Capt., USAF
PETRUZZI, Nora J., Capt., USAF
POLLEY, Fern H., Capt., USAF
SALENIUS, Norma A., Capt., USAF
SHEIRICH, Dolores L. S., Capt., USAF
SIMPSON, Olivia H., Capt., USAF
SNAVLEY, Joyce M., Capt., USAF
SPACKMAN, Helen J., Capt., USAF
SPINELLI, Marie T., Capt., USAF
SUHRHOFF, Mary L., Capt., USAF
THOMAS, Lorna R., Capt., USAF
THOMPSON, Ruby M., Capt., USAF
WEAVER, Phyllis J., Capt., USAF

ANNUAL MEETING OF MILITARY SURGEONS IN WASHINGTON, D. C., NOVEMBER 12-14

The expanding horizons of military medicine will be the theme of the 63d annual convention of the Association of Military Surgeons of the United States which will be held at the Statler Hotel, Washington, D. C., from 12-14 November 1956. In addition to the program listed below, a record number of 14 technical and scientific exhibits have been planned for display throughout the meeting.

Monday Morning, 12 November

Presiding: Rear Adm. Winfred P. Dana, MC, USN, President

Association President's Address—Rear Adm. Winfred P. Dana, MC, USN, Assistant Chief for Aviation and Operational Medicine and Research and Medical Military Specialties, Bureau of Medicine and Surgery, Department of the Navy.

Welcoming Remarks—Edward H. Cushing, M. D., Deputy Assistant Secretary of Defense (Health and Medical).

Guest Speaker—Detlev W. Bronk, Ph. D., President, National Academy of Sciences.

Expanding Horizons: Career Incentives—Rear Adm. Bruce E. Bradley, MC, USN, Acting Surgeon General, Department of the Navy.

Medicare Law—Maj. Gen. Silas B. Hays, MC, USA, Surgeon General, Department of the Army.

Expanding Horizons of Aviation Medicine—Maj. Gen. Dan C. Ogle, USAF (MC), Surgeon General, Department of the Air Force.

Expanding Horizons: Teamwork in Civilian and Military Health Services—Leroy E. Burney, M. D., Surgeon General, U. S. Public Health Service, Department of Health, Education, and Welfare.

Expanding Horizons in Research and Education in the Veterans Administration—Roy A. Wolford, M. D., Deputy Chief Medical Director, Veterans Administration.

Monday Afternoon

Presiding: Winchell McK. Craig, Rear Adm., MC, USNR (Ret.), Section of Neurological Surgery, Mayo Clinic, Rochester, Minn.

Hormone-Producing Tumors—Roy Hertz, M. D., Chief, Endocrinology Branch, National Cancer Institute, National Institutes of Health.

Replacement Arthroplasty in Military Patients—Lt. Col. Earl W. Brannon, USAF (MC), 3700th U. S. Air Force Hospital, Lackland Air Force Base.

Preliminary Studies on Bovine Embryo Skin Grafts—Lt. A. N. Silvetti, MC, USNR, Naval Medical Research Institute, National Naval Medical Center, and Blair O. Rogers, M. D., Clinical Instructor in Plastic Surgery, New York University College of Medicine.

Experiences with the Adenovirus Vaccines in Navy Recruits (Co-operative studies of the U. S. Navy, the University of Chicago, and the U. S. Public Health Service)—Joseph A. Bell, M. D., Chief, Epidemiology Section, Laboratory of Infectious Diseases, National Institute of Allergy and Infectious Diseases, National Institutes of Health.

Tuesday Morning, 13 November

Presiding: Brig. Gen. Stanhope Bayne-Jones, MC, USAR (Ret.), Formerly Technical Director of Research, Office of the Surgeon General, Department of the Army.

Significance of Leptospirosis in Military Medicine—Lt. Col. Leslie C. Murphy, VC, USA, Deputy Director, Division of Veterinary Medicine, Walter Reed Army Institute of Research.

Rapid Extracorporeal Oxygenation of Banked Blood—Capt. William G. Malette, USAF (MC), Resident Surgeon, Denver Veterans Administration Hospital; William B. Summers, M. D., Denver Veterans Administration Hospital; and Ben Eiseman, M. D., Chief of Surgical Service, Denver Veterans Administration Hospital, and Associate Professor of Surgery, University of Colorado School of Medicine.

Military Operations in Radiologically Contaminated Areas—Lt. Col. James B. Hartgering, MC, USA, Director, Division of Physiology and Pharmacology, Walter Reed Army Institute of Research.

Anorganic Bone: Chemistry, Anatomy and Biological Reaction—Comdr. Fred L. Losee, DC, USN, Naval Medical Research Institute, National Naval Medical Center, and Lloyd A. Hurley, M. D., Harlan Memorial Hospital, Harlan, Ky.

Late X-Ray Evidence of Spontaneous Reduction of Dislocation of Cervical Intervertebral Discs—Benjamin H. Kesert, Col., USAR, Consultant in Neurology, Veterans Administration Hospital, Hines, Ill.; Associate, Department of Neurology and Psychiatry, Northwestern University Medical School.

X-Ray Cineradiography and Portable X-Ray Units—Adolph T. Krebs, M. D., Head, Radiobiology Department, Army Medical Research Laboratory, Fort Knox, Ky.

Tuesday Afternoon

Presiding: Col. Victor A. Byrnes, USAF (MC), Director of Professional Services, Office of the Surgeon General, Department of the Air Force.

Preservation of Whole Blood by Freezing—Harold F. Meryman, M. D., Department of Internal Medicine, Yale Medical School.

Cold Weather Survival—Maj. Stanley Lutz, Jr., USAF (MC), Assistant Surgeon, Headquarters, 18th Air Force, Donaldson Air Force Base.

Atherosclerosis and Lipid Metabolism—Daniel Steinberg, M. D., Chief, Section on Metabolism, National Heart Institute, National Institutes of Health.

Results of Early Studies on Effects of Sleep Deprivation—David McK. Rioch, M. D., Director, Division of Neuropsychiatry, Walter Reed Army Institute of Research.

A Hearing Evaluation of an Air Force Squadron of Jet Aircraft Maintenance Personnel—Capt. R. G. Hansen, USAF (MSC), Wright Air Development Center, Wright-Patterson Air Force Base.

Wednesday Morning, 14 November

Presiding: William S. Middleton, M. D., Chief Medical Director, Veterans Administration.

Neurological Complications of Spinal Anesthesia—Myron J. Levin, M. D., Clinical Professor of Anesthesia, University of Illinois College of Medicine, Chicago, Ill.; Assistant Chief, Anesthesia Section, Veterans Administration Hospital, Hines, Ill.

Radiation Control Problems Aboard Nuclear Submarines—Lt. Comdr. John H. Ebersole, MC, USN, Medical Officer, U. S. S. *Seawolf* (SSN 575).

Clotting Factor Abnormalities in Chronic Liver Disease—Joseph R. Goodman, Ph. D., Head, Physiological Research Unit, Medical Research Program, Veterans Administration Hospital, Long Beach, Calif.; Research Associate, Department of Biochemistry and Nutrition, University of Southern California Medical School, Los Angeles, Calif.

The Wholesomeness of Irradiated Food and Its Military Implications—Col. Tyron E. Huber, MC, USA, Research and Development Division, Office of the Surgeon General, Department of the Army.

Practical Application of Pulmonary Physiology for Small Hospitals—Maj. Robert B. Stonehill, USAF (MC), Chief of Pulmonary Disease Section, Lackland Air Force Hospital.

Wednesday Afternoon

Presiding: David E. Price, M. D., Assistant Surgeon General, U. S. Public Health Service, Department of Health, Education, and Welfare.

Future Trends in Military Aviation Medicine—Capt. Ashton Graybiel, MC, USN, Director of Research, School of Aviation Medicine, Naval Air Station, Pensacola, Fla.

Experiences in Evacuation of Severely Burned Patients—Lt. Col. Robert D. Pillsbury, MC, USA, Deputy Commander, Surgical Research Unit, Brooke Army Medical Center.

The Effect of Thyroid Ablation Upon Serum Cholesterol and β-Lipoprotein Spectrum—Joseph R. Goodman, Ph. D., Head, Physiological Research Unit, Investigative Medicine Service, Veterans Administration Hospital, Long Beach, Calif.; Research Associate in Biochemistry, University of California Medical School, Los Angeles, Calif.

Nurse Anesthetist Refresher Course—Capt. Richard J. Ward, USAF (MC), 7100th U. S. Air Force Hospital, Wiesbaden, Germany.

Medical Education for National Defense—Col. Shelden S. Brownton, USAF (MC), Director of Staff, Office of Secretary of Defense (Health and Medical).

The Tranquilizing Drugs—Edward V. Evarts, M. D., Acting Chief, Laboratory of Clinical Sciences, National Institute of Mental Health, National Institutes of Health.

Effects of Microwaves: Current and Proposed Research—Maj. Daniel B. Williams, USAF (MC), School of Aviation Medicine, U. S. Air Force, Randolph Air Force Base.

BOOKS

Reviews of Recent Books

BLAKISTON'S NEW GOULD MEDICAL DICTIONARY, A modern comprehensive dictionary of the terms used in all branches of medicine and allied sciences, including medical physics and chemistry, dentistry, pharmacy, nursing, veterinary medicine, zoology and botany, as well as medicolegal terms, edited by *Normand L. Hoerr,* M. D., and *Arthur Osol,* Ph. D., with the cooperation of an editorial board and 88 contributors. 2d edition. 1,463 pages; 252 illustrations on 45 plates, 129 in color. The Blakiston Division, McGraw-Hill Book Co., Inc., New York, N. Y., 1956. Price $11.50.

Here is the dictionary that medical writers and editors have been waiting for. Compiled by a distinguished editorial board and 88 eminent and authoritative contributors in specialized fields, this completely revised and enlarged new edition has kept pace with our ever-growing, rapidly changing, current medical and surgical language. Thousands of new entries (some 12,000), changes (8,000), and modernization of spellings and usage are incorporated; and obsolete and unused terms have been deleted. Recognition of usage was a determining factor in selection. With the exception of the tables on diet and veterinary doses, the same helpful tables and lists, some revised, comprise the appendix; the color plates and halftone illustrations remain as in the first edition. A new table on radioactive and other isotopes commonly used in medicine has been added.

Definitions are concise, clear, accurate. Pronunciation is simplified by syllable division and accent and, when necessary, by phonetic respelling. A convenient key to the respellings acts as a helpful, easy guide.

Rapid finding of any term is facilitated by clear italic, roman, and boldface type. When series of subentries follow main entries they have been set in indented columnar form and each item set off in boldface type.

Altogether, the practitioner, student, medical author and editor, and all others concerned with medicine and the allied fields will appreciate this practical, helpful, and discriminating work.—*E. W. MARTIN*

CLINICAL LABORATORY DIAGNOSIS, by *Samuel A. Levinson,* M. S., M. D., Ph. D., and *Robert P. MacFate,* Ch. E., M. S., Ph. D. 5th edition. 1,246 pages; 244 illustrations and 13 plates, 11 in color. Lea & Febiger, Philadelphia, Pa., 1956. Price $12.50.

Five years have elapsed since the last edition of this standard and highly regarded text in clinical pathology. It has been revised, enlarged by 100 pages, and brought up to date. However, the number and titles of the chapters are identical with the previous edition.

The entire chapter on hematology has been revised to include current knowledge of hemorrhagic diseases, anemias, and leukemias. Newer knowledge concerning hemoglobin components along with the use of paper electrophoresis in the analysis of these components is presented. The entire section on hematology is particularly well done. The section on chemistry includes new microchemical methods, additional spectrophotometric analyses, and the spectrum analysis of hemoglobin derivatives, as well as a new discussion on electrolyte balance studies. There is an adequate discussion of blood groups, Rh factor, and the Coombs' test, but the section on blood bank procedures is very brief for this extremely important phase of laboratory work. The reader is referred to the standard texts and reference manuals for details of these procedures. The methods for the performance of the Venereal Disease Research Laboratory slide and tube flocculation tests are included in the chapter on immunology and serology. There is even a brief discussion of the *Treponema pallidum* immobilization test. The chapter on bacteriology has been rewritten with the addition of the method for the determination of the antistreptolysin titer of sera and other new technics. Modifications and improvements have been made in the chapters on tropical diseases and histologic technic. The section on legal medicine and toxicology is an excellent review or introduction to this special field. There is an adequate index as well as a table referring the reader to the proper page for important laboratory tests in the common diseases.

The authors have attempted to bring together in a single volume all the many phases of clinical pathology. They have achieved this objective in discussing the most useful methods of laboratory medicine in a systematic, concise manner. The book is well printed with numerous excellent illustrations. It is highly recommended to the medical student, medical technologist, practicing physician, and pathologist as an authoritative text in clinical laboratory methods.

—*MILWARD W. BAYLISS, Col., MC, USA*

DISEASES OF THE SKIN, by *Richard L. Sutton,* Jr., A. M., M. D., F. R. S. (Edin.). 11th edition. 1,479 pages; 1,972 illustrations. The C. V. Mosby Co., St. Louis, Mo., 1956. Price $29.50.

The 11th edition of this standard textbook of dermatology is a worthy successor to the previous editions. During the 13 years since this book was last reprinted and emended, many advances have been made in the specialty, and the author has successfully noted and included in this work these additions. The author has been peculiarly successful in adding to the book hundreds of photographs, many more pertinent subjects and improved discussions. This edition is written more as an outline than previous ones, some subjects having been cut considerably, yet have been treated more precisely and informatively than before. The photographs are superb. The author has added the more recent therapeutic advances in pertinent portions of his text. ACTH, cortisone, and hydrocortisone are discussed, and their uses outlined. There

is a very fine section on chemical agents, antibiotics, antihistamines, the older drugs, and their modes of action. The section on peripheral vascular diseases has been improved and the chapter on drug eruptions expanded.

When more than one reference is given in the index, the main reference page number is printed in heavier type, an improvement over the previous edition. The syndromes are listed in the index, an aid to students and specialists alike. The classification of some disease groups has been simplified and stated in outline form in many instances. The author has been successful in presenting the relationship between diseases of the skin and internal disease. There is some reference to almost all that is known in dermatology. It would be difficult to conceive of a text which contains more useful information in as many pages. This book is a "must" for any serious student of dermatology and an encylopedic reference work for the specialist.

—*LOUIS S. LELAND, Col., MC, USA*

CLINICAL ORTHOPAEDICS, No. 6. *Anthony F. DePalma,* Editor-in-Chief. 219 pages; illustrated. J. B. Lippincott Co., Philadelphia, Pa., 1955. Price $7.50.

This is the sixth of a series of volumes presented as an official publication of the American Fracture Association. The series, begun in 1953, is published twice annually under the auspices of the Association of Bone and Joint Surgeons. Six more volumes in the form of symposia on various subjects are scheduled for publication within the next three years.

This volume is divided into three sections labeled "Endoprosthesis," "General Orthopaedics," and "Items" respectively. Section 1 devotes 85 pages to 10 articles contributed by various authors. It contains an excellent article by Dr. E. L. Compere who writes on the treatment of osteoarthritis of the hip by means of the prosthetic arthroplasty. There is also in this section a thought-provoking paper titled "Complications in Replacement Arthroplasty of the Hip" (the authors dislike the term "replacement prosthesis"). In this article there is presented a startling array of complications as well as a mortality rate of 18 per cent in a group of 66 patients whose average age was 73 years. Contrary to the conclusions of the authors, the article demonstrates vividly that one can expect catastrophic results from the poor surgery exhibited in an indifferent therapeutic approach to a major surgical problem.

Of special interest in Section 2 is a paper dealing with the effects of aureomycin used as complementary feeding to 25 children afflicted with Legg-Calvé-Perthe's syndrome. The rather optimistic conclusions of the author do not appear to be corroborated by the complex charts which accompany the article.

Section 3 is made up of three short papers that appear to have been appended as an afterthought—a pleasant afterthought at that. Two of

the papers are essays by British authors and offer spicy reading in a philosophic vein.

This volume contains no preface; however, a note behind the title page states that it "is designed for the publication of original articles offering significant contributions to the advancement of surgical knowledge." The reader may seriously question the fulfillment of this design.

The excellent illustrations and handsome format make this a nice book for the library. The sketchy character of its contents detracts from its value as an authoritative symposium or competitor for existing publications (which incidentally are more reasonably priced).

—*HERBERT A. MARKOWITZ, Capt., MC, USN*

A PICTORIAL HISTORY OF MEDICINE, by *Otto L. Bettmann,* Ph. D. With a Foreword by *Philip S. Hench,* M. D. 318 pages; 900 illustrations. Charles C Thomas, Publisher, Springfield, Ill., 1956. Price $9.50.

For a number of years observant readers, especially those interested in medical history or cultural history, may have noticed illustrations whose captions included the credit line "Bettmann Archives." Those who have wondered about this Archive may have learned that it is the name of a rich and varied collection of pictures culled from many sources and lands on a great number of subjects by Dr. Otto Bettmann, formerly of Germany and now of New York City. Writers who need pictures to illustrate books and articles, especially of historical content, can often find pictures there which are available nowhere else.

From this Archive, Dr. Bettmann has selected almost 1,000 pictures to illustrate the progress of medicine from ancient Egyptian times to the opening of the present century. Along with these pictures are not only captions but a running text which is both readable and entertaining. Included are numerous portraits of great medical men from Imhotep and Hippocrates, Vesalius and Harvey, to Osler and Fleming. There are scenes illustrating ancient surgical procedures, medieval hospitals, and medical costumes through the ages, and also medical caricatures. In short this is a rich mine of pictorial information hard to find in any but the largest medical libraries.

Although there are many full-page plates, the majority of the pictures are smaller, and not a few are almost postage-stamp size. It is a pity that it was not possible to do a better job of reproduction since many of the smaller pictures have been reduced almost to the point of illegibility. A second volume of the modern period will be awaited with interest.—*MORRIS C. LEIKIND*

ESSENTIALS OF DERMATOLOGY, by *Norman Tobias,* M. D. 5th edition. 651 pages; 211 figures; 11 subjects in color. J. B. Lippincott Co., Philadelphia, Pa., 1956. Price $8.

This textbook for medical students and general practitioners has been widely used since the first edition appeared in 1941. It does not pretend to exhaustively discuss the etiologic, physiologic, pathologic,

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diagnostic, and therapeutic aspects of diseases of the skin. It is a brief, practical, and useful text for the student and practitioner.

The book is well illustrated with both black and white and colored plates, and the printing is excellent. Organization of the subject matter is practical and useful. Particularly helpful to the nonspecialist is the section included in each chapter on those aspects of nursing that are particularly germane to the diseases considered.

The chapter on general therapeutic suggestions will prove to be a most helpful guide to the beginner.

Dr. Tobias again has succeeded in presenting a wide and difficult subject in a concise and readable form, yet complete enough for everyday use. This book is highly recommended for students of medicine and the nonspecialist.—*VICTOR R. HIRSCHMANN, Col., MC, USA*

WORLD-ATLAS OF EPIDEMIC DISEASES, Part II, Fourth Issue, edited under the Sponsorship of the Heidelberger Akademie der Wissenschaften by Professor Dr. med. *Ernst Rodenwaldt,* Heidelberg, in Collaboration with Privatdozent Dr. med. habil. *Helmut J. Jusatz,* Heidelberg. 36 pages; 11 colored maps. Falk-Verlag, Hamburg 1, Germany, 1956. Price 32 Deutsche marks, plus extra charge for postage and packing.

Any attempt, such as this book makes, to portray African diseases in their entirety in so many diversely governed, seminomadic peoples living under such a variety of climatic and social conditions is bound to leave the student with a feeling of uncertainty. However, such comprehensive coverage will certainly serve as a very fine basis for future studies and evaluation of reports from these areas. Plague, leprosy, poliomyelitis, and smallpox are discussed in detail, and the great gaps in information are clearly stated in the text. The maps, as usual with this series, are detailed and contain data oriented as to time and place, but not as clearly as to race. The text clarifies the map presentations, but careful interpretation is required.

In discussing plague, it was noted that the gigantic wave between 1920 and 1930 carried the series of yearly and seasonal waves to a high crest. No explanation for this large wave was attempted, but it may help explain many baffling facts about plague in this and other areas.

Leprosy and its relationship to tuberculosis, diet, poor sanitation, migration, climate, living conditions, and customs are discussed, but no over-all panaceas are proposed. The changing picture of leprosy in Africa since 1900 and the conclusion, attributed to many authorities, that the total incidence is declining may be misleading. This problem is apparently still very great.

There are five fine climatologic maps of Africa that give fairly detailed data on January and July temperatures, total yearly precipitation in the rainy and dry seasons, and a map of thermal sultriness values (range of comfort)—all of which are of great value in considering the ecology of disease.—*GOTTLIEB L. ORTH, Col., MC, USA*

A TEXTBOOK OF OPERATIVE DENTISTRY, by *William H. O. McGehee*, D. D. S., M. D., F. A. C. D., *Harry A. True*, D. D. S., F. A. C. D., and *E. Frank Inskipp*, D. D. S., F. A. C. D. 4th edition. 720 pages; illustrated. The Blakiston Division, McGraw-Hill Book Co., Inc., New York, N. Y., 1956. Price $14.

This is the latest edition of a text that has been standard in its field since 1930. It presents the subject as completely as can be expected in one volume. The first two editions were authored by Doctor McGehee alone, he was joined by the named co-authors for the third edition, and the present edition lists 20 other contributors.

This is a thoroughly modern textbook. Narrative and outline forms of presentation are admirably blended to permit the inclusion of much material without increasing the difficulty of productive study. The 423 figures contain many hundreds of individual illustrations, plus figures from earlier editions. The use of new high-speed materials and technics is presented in a chapter entitled "Accuracy with Speed." In addition to the expected chapters dealing with dental caries, cavity form, cavity preparation, instrumentation, and filling materials, there are chapters discussing such subjects as efficiency in the arrangement of the dental office and the role of the dental assistant in operative dentistry. Endodontics is presented in a separate chapter, and there is a 93-page chapter on operative dentistry for children, authored by Charles A. Sweet, Sr., and I. Irwin Beechen. As in earlier editions, the importance of adequate diagnosis as a requisite to adequate restorative dentistry is stressed.

The material is both well organized and comprehensively treated; subjects are readily discoverable in the index, easily located in the text, and clearly and concisely presented. This volume can be recommended to both students and practicing dentists.

—*JAMES E. CHIPPS, Lt. Col., DC, USA*

NEW AND NONOFFICIAL REMEDIES 1956, Containing Descriptions of Drugs Evaluated by the Council on Pharmacy and Chemistry of the American Medical Association. An Annual Publication Issued Under the Direction and Supervision of the Council. 540 pages; illustrated. J. B. Lippincott Co., Philadelphia, Pa., 1956. Price $3.35.

This annual publication of the Council on Pharmacy and Chemistry of the American Medical Association describes drugs, arranged according to their pharmacologic action or clinical use, that have been evaluated by the Council but have not been included in the *Pharmacopeia of the United States, The National Formulary*, or, for a prior cumulative 20-year period, in previous *New and Nonofficial Remedies* (NNR). The scope of the book was expanded this year to include not only established useful drugs but also information on all available new drugs. As a result 60 monographs on new drugs were added this year, while only seven from last year's NNR were omitted.

Drugs are described under nonproprietary titles with their chemical or biologic identity, including their actions, uses, side effects, toxi-

city, dosage, and routes of administration. Names of commercial preparations are listed after each monograph.

The general index at the end of the book lists the drugs by their commercial as well as their nonproprietary names.

This volume serves the purpose for which published: to give pertinent and reliable information on new and nonofficial remedies and thereby to encourage rational therapy.—*PATRICK I. McSHANE, Col., MC, USA*

TEXTBOOK OF MEDICAL PHYSIOLOGY, by *Arthur C. Guyton,* M. D. 1,030 pages; illustrated. W. B. Saunders Co., Philadelphia, Pa., 1956. Price $13.50.

This textbook is written primarily for students and is not a reference work. The author's stated intent is to present the philosophy and logic of the mass of knowledge needed by the physiologist and physician. He has accomplished this goal for the medical student by blending enough anatomy and pathology to stimulate the student's interest in the practical aspects of physiology. However, for the physiology student there is too little emphasis on basic mechanisms and the underlying biophysical principles involved. There is only an occasional use of mathematical models, which in many cases can cleverly and simply define a complicated process.

The book consists of 11 major subdivisions and 75 chapters. The subdivisions follow classical lines, *i. e.,* respiration, neurophysiology, circulation, et cetera. The physiologic aspects of aviation, deep-sea diving, and nuclear radiation are covered in special sections but are very brief. There are several misstatements in a short discussion of the "effects of the atom bomb blast on the body."

At the end of each topic a carefully selected bibliography is included. These references were selected for their own broad bibliographies as well as for their individual value and are exceedingly helpful.

In spite of the above limitations, this is a very readable book which will provide anyone interested in human biology with a readily understandable general review.—*JAMES B. HARTGERING, Lt. Col., MC, USA*

YEAR BOOK OF DERMATOLOGY AND SYPHILOLOGY (1955-1956 Series), by *Rudolf L. Baer,* M. D., and *Victor H. Witten,* M. D. 480 pages; illustrated. The Year Book Publishers, Inc., Chicago, Ill., 1956. Price $6.50.

This yearbook contains nearly 400 abstracts of articles received by the editors from December 1954 through November 1955. It has the same format and table of contents as previous editions and has an original article by the authors on therapy with superficial x-rays and Grenz rays. Many foreign articles are abstracted. Some abstracts are rather long and could be shortened to make room for summaries of additional articles. The editors emphasize the current studies on cutaneous enzymes and lipid metabolism, and new information is presented on the relationship of skin diseases and systemic involvement.

Acanthosis nigricans, incontinentia pigmenti, and acrodermatitis atrophicans are currently receiving much attention. Psoriasis, the ubiquitous enigma, is at long last receiving much therapeutic and biochemical investigation.

The abstracts on therapy are useful. Of interest are those on the use of ACTH, cortisone, and hydrocortisone. Various forms of radiation therapy for dermatoses are presented. The forms of radiation such as high-energy electrons and soft radiation from beryllium window tubes may prove of particular value, being highly effective on skin lesions and having little effect on the underlying tissues.

Dermatology needs a good cumulative index. Until one is produced, however, the yearbooks will provide a good working basis for the researcher as well as a general review source.

—*WILLIAM N. NEW, Capt., MC, USN*

OF WATER, SALT AND LIFE, an atlas of 36 pages illustrating 31 color plates, prepared and distributed by Lakeside Laboratories, Inc., Milwaukee, Wis., 1956.

This little book is a beautifully illustrated atlas of fluid and electrolyte balance in health and disease. It consists of 31 colored plates opposite short descriptions of such topics as acid-base balance, pharmacology of diuresis, congestive heart failure, cirrhosis, nephrosis, et cetera. Although some figures require a certain amount of concentration the book does present the feeling of dynamic processes. It should prove to be a valuable aid both to students and to practitioners who may deal with "water, salt, and life."—*S. O. WAIFE, Lt. Comdr., MC, USNR*

DISEASES OF THE ENDOCRINE GLANDS, by *Louis J. Soffer,* M. D., with *J. Lester Gabrilove,* M. D., and the Section on Gonads by *Arthur R. Sobval,* M. D. 2d edition. 1,032 pages; 102 illustrations and 3 plates in color; 28 tables. Lea & Febiger, Philadelphia, Pa., 1956. Price $16.50.

The author discusses the diseases of endocrine glands in separate sections for each gland or, in a few cases, two glands. Reviews of anatomy, embryology, and physiology, which precede the clinical descriptions in each section, contain the details essential for complete understanding of clinically recognizable disease. The chapter on carbohydrate metabolism and diabetes mellitus, included in the first edition, has been excluded from this edition.

Many case reports are advantageously used to amplify the author's descriptions of diseases. The illustrations are clear and adequate, except for a paucity of pictures of patients. Greater use of structural chemical formulas and of tables to bring out similarities of, and differences between, various products of one endocrine gland could add to the value of future editions.

The clarity of presentation makes for easy reading and understanding. The author has, indeed, struck an excellent balance between space allotted to theory and to practice. The endocrinologist interested in the

historical development of our knowledge is unlikely to turn to this book, which is, however, excellently suited to the needs of other physicians.

Because the book is truly up to date in most respects, it was disappointing to read only of the intramuscular corticotropin-eosinophil test for adrenal cortical insufficiency in the section on Addison's disease. Reference is made to Thorn's work, published in 1948. In the appendix, tests using intravenous and intramuscular injection of ACTH are described. However, even there the limitations of the intramuscular injection technic are not discussed.

The appendix (which is devoted to laboratory tests of endocrine function) should be useful to most readers. It could be improved by clarifying the arrangement of order of the tests, perhaps by the use of a preliminary outline or by the use of headings.

In summary, this book can be recommended to general practitioners, internists, and specialists other than endocrinologists as a volume which combines discussions of physiology and disease, theory and practice, and clinical and laboratory aspects in optimum proportions.

—ROBERT J. HOAGLAND, Col., MC, USA

ADVANCES IN VETERINARY SCIENCE, Volume II, edited by *C. A. Brandly* and *E. L. Jungherr.* 449 pages; illustrated. Academic Press, Inc., Publishers, New York, N. Y., 1955. Price $10.

This volume continues the approach made in 1953 in Volume I directed toward the periodic review of progress in the more active fields of research pertinent to veterinary medical science. The editors have had the benefit of a distinguished advisory board in the review and editing of the 11 individual contributions comprising the volume.

The subjects discussed are epizootiology of virus diseases, mycoses in animals, respiratory diseases of poultry, the blood groups of animals, disease caused by deficiencies of trace elements, photosensitization in animals, rumen dysfunction, bovine ketosis, tickborne rickettsioses in South Africa, vibriosis, and effective control of internal parasites.

Each subject is followed by a bibliography. The value of this work is further enhanced by complete author and subject indexes at the back of the volume.

The reviewer inevitably finds himself more interested in some of the areas concerned than in others. Likewise, the differences in approach by the several contributors are pronounced. These range from almost pedantic undergraduate-level abstracts of the literature to extraordinarily thought-provoking interpretations and estimations of the significance of the newly uncovered findings of veterinary and medical research.

The reviewer has seldom encountered a more fascinating and stimulating paper than the contributions on the epizootiology of virus diseases by R. E. Shope. This alone is sufficient to merit the inclusion

of the volume in the libraries of all interested in infectious disease and in veterinary medicine.

In like manner, the discussion of the blood groups of animals by L. C. Ferguson not only merits careful reading but further serves as a ready reference for valuable technics and methodology.

The editors, the advisory board, and the individual contributors have admirably met their objective of producing a volume "of greatest use to the serious student, the research worker, and the practitioner (of veterinary medicine)." This volume should be required reading for all veterinarians of the armed services.

—*WILLIAM S. GOCHENOUR, Jr., Lt. Col., VC, USA*

CAUSAL FACTORS IN CANCER OF THE LUNG, by *Carl V. Weller*, M. S., M. D. American Lecture Series, Publication No. 277, A Monograph in American Lectures in Chest Diseases, edited by *J. Arthur Myers*, M. D., Ph. D. 113 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1956. Price $3.

Regardless of the time available, it is the dream of every lecturer to be permitted an additional 15 minutes to devote to his subject. The Charles C Thomas Company has done just this in a number of monographs called the "American Lecture Series." Outstanding authorities have been allowed to revise, expand, and annotate their most popular lectures. These have been published and, despite the variety of subjects and of authors, have generally maintained a very high quality. Strangely, the publishers "do not have a completely up-to-date list of The American Lecture Series." To the reviewer this seems a pity. Those volumes of the series which he has examined in the past have been worth owning.

The present volume is typical of this series. The lecture has been expanded to a monograph, supplemented by 121 carefully and well-chosen references. Following a discussion of general considerations, Dr. Weller develops in detail a first theme describing bronchogenic carcinoma as an endemic occupational disease in miners, a second theme describing the search for causes of cancer of the lung in the 20th century, and a third theme concerned with the relation between tobacco smoking and bronchogenic carcinoma.

Although the subject of the lecture is sharply limited, the material is presented in an interesting and even exciting manner. The author has accomplished his objective, which was to explore the "causes, intrinsic and extrinsic, proved and suspected, of bronchogenic cancer." The type and engravings are of high quality, the binding is leatherette, and the volume is handsome in appearance. It is recommended as a valuable addition in any general library and to physicians and workers with a special interest in this field. For those who may have to lecture on this subject, this monograph would be of considerable value.

—*ARTHUR STEER, Lt. Col., MC, USA*

CURRENT THERAPY, 1956, Latest Approved Methods of Treatment for the Practicing Physician, edited by *Howard F. Conn,* M. D. and 12 consulting editors. 632 pages. W. B. Saunders Co., Philadelphia, Pa., 1956. Price $11.

This is the eighth edition of this compendium of therapy which fortunately has resisted the expansion in bulk which usually occurs with medical books from edition to edition. The contributors are selected from recognized authorities who are especially interested in the specific disease discussed. They vary with the edition and consequently new viewpoints are given. The outlines of therapy are brief and practical, and treatment methods found useful in the past are not discarded if still effective, although obsolete methods of treatment are omitted.

There is a multitude of new drugs available and those well tried are included; experimental drugs are not included, and note is made when treatment methods not fully tested are given.

At times two different methods of approaching treatment are noted, either of which might be followed successfully or from which the reader might evolve a third of his own, proving that medicine as an art is not yet dead.

This book is a useful desk reference, brief and to the point, which gives the essentials of therapy of each disease and the most up-to-date methods and drugs, and which prevents one's missing some new aspect of treatment.—*JAMES L. TOBIN, Col., USAF (MC)*

THERAPEUTIC USE OF ARTIFICIAL RADIOISOTOPES, edited by *Paul F. Hahn,* Ph. D. 414 pages; illustrated. John Wiley & Sons, Inc., New York, N. Y., 1956. Price $10.

This 400-page volume represents a compilation of 29 research men's experience in the use of isotopes over a 20-year period. The editor's choice of authors seems for the most part to reflect his philosophy of being more forthright and willing to take some scientific risks in incurable patients in order to more fully understand the capabilities of these medical tools. He feels irradiation is a therapeutic weapon and is not the panacea to the cancer problem. He proceeds to show the results of thorough scientific research in an inspiring and challenging way.

The order of presentation of chapters is excellent. Prefacing the individual uses of isotopes is a section including a short history of the use of radioisotopes, the problems facing even the most astute scientist in using them, their procurement and safe handling, and their effects on tissue. Within these first chapters is an effective blending of doctors of medicine and doctors of other scientific fields. Chapters 2 and 3 might be disconcerting to the novice in this field, and possibly keep him from finishing the book. Yet the subjects of radiologic physics and dosimetry of internal radioisotopes are concisely presented, and by carefully studying these chapters a wide knowledge can be gained in a short time. The procurement of isotopes has been brought

up to date with the addendum to chapter 4. The work by Hymer L. Friedell and P. R. Salerno as reviewed in chapter 6 presents a challenge to all those working in this broad field. Radiation effect is little enough understood, let alone the effect of multiple types of radiation. These men outline methods of research into the synergistic effect of isotopes used in combination that would be well used by others in studying this most urgent problem. Edwin E. Osgood's chapter on the treatment of leukemias and polycythemia vera with radioactive phosphorus is a splendid review of a method of treating the complete patient. The basic histophysiology upon which this treatment is based has been well investigated by the author, and the complete way in which he outlines his course of therapy is excellent. The work by Osgood, Tivey Seaman, et al. is classical. The next chapter also deals with investigative methods for treatment of chronic leukemias, presenting case histories to highlight questions as to mode of action of radiation, problems faced during treatment, and choice of isotopes in treating this disease state.

Chapter 9 is an excellent review of the use of radioiodine in thyrotoxicosis and a brief note on its use in cardiac disease. Chapter 10, on treatment of thyroid carcinoma, is on clinical selection of patients, methods of use of iodine, dosimetry of radiation within the body, complications, a summary of what the author thinks is reasonable management of treatment, and safeguards for the patients and personnel.

The next seven chapters deal with specific colloids, applicators, and implants of isotopes within or on the body in attempts to ablate or palliate cancerous tumors. These chapters have been written by specialists in each field and represent the most advanced knowledge on these subjects. The last chapter, written by G. H. Fletcher, is a concise summary of this man's thought on the advantages and disadvantages of this method of treatment. The book is invaluable to specialist and general practitioner as a guide and review of what has been done in this field.—*RICHARD E. OGBORN, Maj., MC, USA*

THE MEDICAL DEPARTMENT OF THE UNITED STATES ARMY. Surgery in World War II. Hand Surgery, edited by *Sterling Bunnell,* M. D. 447 pages; illustrated. Prepared in the Historical Unit, Army Medical Service, under the direction of Colonel *Calvin H. Goddard,* MC, AUS. Editor-in-Chief, Colonel *John Boyd Coates, Jr.,* MC, USA; Associate Editor for Hand Surgery, *Mary E. McDonald;* Assistant Editor, *Janie W. Williams.* Office of the Surgeon General, Department of the Army, Washington, D. C., 1955. For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. Price $3.50.

This volume is both a historical document and a report of a clinically important collective experience in the management of the injured hand. Although the format of résumés of experiences in the individual theaters of operation and hand centers results in considerable repetition, the basic principles of hand surgery are so unanimously and emphatically emphasized that their importance cannot be missed.

The book is well illustrated with photographs, sketches, and photographic copies of roentgenograms which are usually well placed to conform with the text. Many of the illustrations, however, are so reduced in size that their value is lost—this is particularly true of the roentgenograms.

The influence of the editor, as one of the pioneers in the field of hand surgery and as Civilian Consultant for Hand Surgery to the Secretary of War, is felt throughout the book. Chapter 2—consisting of his conclusions based on his experiences as consultant—is a highly concentrated digest of the principles and details of management of the injured hand, but as such might better have been placed at the end so that he could have commented on some of the differences in approach or viewpoint of the various contributors.

Many important lessons can be learned from this book. It is apparent that hand surgery is an important part of any mass casualty situation and that proper care of the injured hand begins in the field. The need for specialized centers staffed by trained and interested personnel is stressed. This is particularly true in the reconstructive phase of hand surgery.

This book is an important contribution to the field of the surgery of trauma. Based on a wide experience, it is a source of general and specific information on all phases of the management of the injured hand. It should be an invaluable addition to the library of the military and industrial surgeon.—*HASKELL M. WERTHEIMER, Comdr., MC, USN*

EPITOME of the Pharmacopeia of the United States and the National Formulary with Comments. Issued under the Direction and Supervision of the Council on Pharmacy and Chemistry of the *American Medical Association.* 10th edition. 322 pages. J. B. Lippincott Co., Philadelphia, Pa., 1955. Price $3.

For the benefit of those not familiar with this volume, it is designed to follow the material published in the *Pharmacopeia of the United States* and the *National Formulary,* but to present it in such a form that it will be more valuable to physicians. The two volumes mentioned provide the standards for drugs and drug preparations; however, they also contain much detail that is of value to the pharmacist or drug manufacturer but is of little interest to physicians.

The present edition, of convenient size as to make its ready reference inviting, contains only the essential definitions and descriptions of the drugs listed, with more detail as to the nature of the remedies, their uses and doses. Adverse comment is made on preparations believed to be of doubtful value; however, the wisdom of this is questioned in view of the great deliberation which goes into the acceptance of drugs for the official volumes.

The items are arranged alphabetically by their English names, the uses of which are of particular interest to the prescribing physician,

as is the information relative to market preparations in which the drugs may be found.

Some of the words of caution found in the official volumes are omitted from this volume. This point is of little importance in those cases where the "caution" was directed at the manufacturer or the dispenser. However, in those cases where the words of caution were of prime importance to the physician prescribing the medicines, their omission could possibly have a disastrous effect.

The reference tables are a handy aid, and the organization is well planned. The volume should prove to be a valuable adjunct to the physician's desk or library.—*ELWOOD M. WRIGHT, Col., MSC, USA*

THE MEDICAL DEPARTMENT OF THE UNITED STATES ARMY. Vascular Surgery in World War II, edited by *Daniel C. Elkin,* M. D., and *Michael E. DeBakey,* M. D. 465 pages; illustrated. Prepared in the Historical Unit, Army Medical Service, under the direction of Colonel *Calvin H. Goddard,* MC, AUS. Editor-in-Chief, Colonel *John Boyd Coates, Jr.,* MC, USA. Office of the Surgeon General, Department of the Army, Washington, D. C., 1955. For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. Price $4.25.

This volume of the medical history of World War II gives a detailed accounting of complications of traumatic vascular injuries in casualties evacuated to the zone of interior. In this book is statistically recorded what is probably the largest and certainly the most recent and most complete series of vascular injuries to date. Although primarily of historical and statistical nature, the authors have included diagnostic methods, various tests, surgical approaches and technics as well as valuable pre- and post-operative physiologic data.

The authors tabulate the expected incidence of gangrene which may follow ligation of major vessels. In doing so, Makins' World War I figures on the subject are clarified as is misleading information in the 1943 Military Surgical Manual relative to the expected incidence of gangrene following ligation.

Care of the patient with traumatic aneurysms and arteriovenous fistulas is fully discussed. Additional space is allotted to the systemic effects of arteriovenous fistulas. Statistical data is presented on the results of obliterative operations for these lesions and the value of reparative surgical intervention is stressed. Along with the discussion on surgery is the consideration for sympathectomy. In addition to this excellent study of traumatic aneurysms and arteriovenous fistulas, the incidence, diagnosis, and treatment of patients in World War II with other peripheral vascular disturbances and vasospastic disorders are presented.

Although most of the material in this volume was published in various medical journals prior to this compilation, it is regrettable that this volume was not available for reference at the beginning of the Korean conflict. While this volume is regarded as particularly valuable for

those doing vascular surgery and especially those in the service during hostilities, it is extremely valuable for the use of all general surgeons who may have occasion to treat the complications of acute vascular injuries.— *CARL W. HUGHES, Lt. Col., MC, USA*

MIGRAINE AND PERIODIC HEADACHE, A Modern Approach to Successful Treatment, by *Nevil Leyton,* M. A. (Cantab.). 2d edition, reprinted. 122 pages. Published by William Heinemann Medical Books, Ltd., London, England, 1954. Distributed by Charles C Thomas, Publisher, Springfield, Ill. Price $2.50.

This small, 122-page textbook on headache is as fascinating to the reader as a work of fiction. However, it encompasses the leading scientific theories on etiologic mechanisms of headache and includes some concepts new to this reviewer. Detailed points in the history and physical examination are listed on the differential diagnosis. In addition, a relatively simple method of tackling the migraine problem is presented. This is long-term treatment with the aim of preventing headaches, lengthening the interval between them, or ameliorating the attacks. In fact, the most commonly prescribed relief remedies are barely mentioned.

The author is certain that there are two factors present in the production of migraine: first, an organic diathesis which enables a second, sensitizing factor to produce the alteration of arterial calibre that causes the intracranial pain. A "trigger mechanism" is necessary to set off the sensitizing factor. This latter may be an overproduction of histamine, the cyclic swing of the estrogenic hormones, or the activation by weather, strain, or chronic disease of a neuralgic syndrome. The "trigger" may be psychologic upset, worry, or fatigue.

Treatment is individualistic and includes the progressive injections of an anterior-pituitary-like hormone, histamine injections, the oral use of prostigmine in progressive courses, and the parenteral administration of Vitamin B_2 as well as the use of several other less effective drugs.

Nineteen selective case histories are presented and discussed to illustrate various types of headaches and responses to therapy. Economic and social considerations are presented. The book has a summary of conclusions and a good bibliography, and is well indexed. Illustrations consist only of tables and schedules of treatment.

This book is highly recommended to all physicians who see and fret with many patients with headaches. It gives a positive approach toward treatment and an optimistic outlook for doctor and patient alike. I cannot evaluate or corroborate the results of treatment by these methods, as there has been only sufficient time since receiving this book to start a few patients on some of the therapies recommended. If others can give relief to 75 per cent of migraine patients as the author does, or even to a smaller percentage, this book will be a most useful reference in managing these recurring minor tragedies of everyday practice.

—*HORACE C. GIBSON, Col., MC, USA*

THE MEDICAL DEPARTMENT OF THE UNITED STATES ARMY. Preventive Medicine in World War II. Volume II: Environmental Hygiene. 404 pages; illustrated. Prepared in the Historical Unit, Army Medical Service. Editor-in-Chief, Colonel *John Boyd Coates*, Jr., MC. Editor for Preventive Medicine, *Ebbe Curtis Hoff*, Ph. D., M. D. Office of the Surgeon General, Department of the Army, Washington, D. C., 1955. For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. Price $3.50.

This volume is one of a series on preventive medicine in the U. S. Army during World War II and records those plans, operations, and activities which modified or controlled the environment for health purposes. The authors have selected from the mass of data available to them those events which highlight the general principles of environmental hygiene and their application under the varying conditions of global warfare. The areas of environmental hygiene covered in this review include: food management, housing, water purification, waste disposal, insect and rodent control, and foreign quarantine. In addition, this volume contains an excellent résumé of the major research developments in preventive medicine during the war, as well as a discussion of the many health problems encountered at the various ports of embarkation.

The result is a concise, well-organized treatise on environmental hygiene as it pertains to a military population during mobilization. It gives the reader a comprehension of the effort, planning, and staffing required of the Medical Department in the successful execution of its mission.

Highly recommended reading for all officers, medical or line, whose present or future responsibilities require a broad knowledge of the means by which military populations are maintained in a state of healthful equilibrium with their environment, it is also recommended for public health officers, graduate students of preventive medicine, civil defense officers, and anyone whose needs require an excellent reference of this type. —*HARVEY G. TOUSIGNANT, Lt. Col., USAF (MC)*

LAUGHTER AND THE SENSE OF HUMOR, by *Edmund Bergler*, M. D. 297 pages. Intercontinental Medical Book Corp., New York, N. Y., 1956, in cooperation with Grune & Stratton, Inc., New York, N. Y. Price $5.

The essence of this entertaining psychoanalytic book is described in the foreword: "The present volume attempts to bring the analytic theory on laughter and wit up to date . . . . This book proposes to show that laughter is a necessary and healthy *internal* debunking process and, therefore, a fear-reducing process . . . ."

Liberally sprinkled with jokes, bright sayings, and witticisms, the book covers the many theories of humor, and the author presents his own interpretation clearly and forcibly. Although some familiarity with psychiatric concepts (superego, psychic masochism, et cetera) is helpful in appreciating the various points of view expressed, even the nonpsychiatrist can find much of interest in this book.

—*S. O. WAIFE, Lt. Comdr., MC, USNR*

THORACIC SURGERY FOR PHYSIOTHERAPISTS, by *Gladys M. Storey*, S. R. N., F. C. S. P., with a foreword by *N. R. Barrett*, M. Chir., F. R. C. S. 132 pages; illustrated. J. B. Lippincott Co., Philadelphia, Pa., 1955. Price $3.

The author of this book provides valuable insights for the student and practicing physical therapist into the conditions which they will encounter and treat in their work. It is a book of basic principles rather than an extensive and detailed study. It offers an understanding of conditions in thoracic surgery which should promote the use of more efficient treatment procedures.

The scope of thoracic surgery has expanded in recent years and now includes the management of many conditions for which, formerly, nothing curative could be attempted. Information on these new technics and procedures will be found in this book. There is discussion of pulmonary, pleural, cardiac, vascular, pericardial, mediastinal, esophageal, and neurologic conditions.—*AGNES P. SNYDER, Lt. Col., AMSC (PT)*

TUMORS OF THE SKIN, by *Herbert Conway*, M. S., M. B., M. D., F. A. C. S. A Monograph in The Bannerstone Division of American Lectures in Surgery, edited by *Michael E. DeBakey*, M. D., and *R. Glen Spurling*, M. D. Plastic Surgery Division, edited by *James Barrett Brown*, M. D. 267 pages; 178 figures; 3 plates in color. Charles C Thomas, Publisher, Springfield, Ill., 1956. Price $13.50.

This monograph is divided into two major sections. The first concerns benign tumors of the skin and the second the malignant tumors of the skin.

Each type of tumor is briefly presented. The discussion is chiefly concerned with clinical characteristics and physical findings, frequency of occurrence, treatment, and follow-up data. Following the discussion of each of the various tumors there is a short bibliography with references as recent as 1954.

Surgical treatment of tumors of the skin is emphasized and there is no attempt made to discuss extensively radiation technics or other nonsurgical methods of treatment. The book is profusely illustrated with photographs of patients with tumors before and after therapy and with artists' sketches of particular operative technics. However, the book is not a textbook of surgery. The operative technics illustrated and discussed are to a large extent detailed to emphasize the application of surgical methods in the removal of skin tumors in locations formerly considered beyond the scope of surgical approach and assigned to nonsurgical methods of therapy.

The arrangement of material in this book and the printing makes it easy to read and to use as a ready reference text. The book should be a valuable addition to the library of interns, residents, and advanced surgeons and should also prove interesting to those in other specialties.

—*GEORGE F. PEER, Col., MC, USA*

New Books Received

Books received by the *U. S. Armed Forces Medical Journal* are acknowledged in this department. Those of greatest interest will be reviewed in a later issue.

POLYSACCHARIDES IN BIOLOGY, Transactions of the First Conference, April 27, 28, and 29, 1955, Princeton, N. J., edited by *Georg F. Springer,* M. D. 271 pages; illustrated. Josiah Macy, Jr. Foundation, New York, N. Y., 1956. Price $5.

PROPRIOCEPTIVE NEUROMUSCULAR FACILITATION, Patterns and Techniques, by *Margaret Knott,* B. S., and *Dorothy E. Voss,* B. Ed. Illustrations by *Helen Drew.* Foreword by *Sedgwick Mead,* M. D. 135 pages; illustrated. Paul B. Hoeber, Inc., Medical Book Dept. of Harper & Bros., New York, N. Y., 1956. Price $5.50.

CLINICAL ORTHOPAEDICS, No. 7, "Tumors of Bone." This number contains a special third section on "Motorist Injuries and Motorist Safety" by *Jacob Kulowski,* M. D. *Anthony F. DePalma,* Editor-in-Chief. 354 pages; illustrated. J. B. Lippincott Co., Philadelphia, Pa., 1956. Price $7.50.

PROCTOLOGY, by *Harry E. Bacon,* M. D., ScD., LL. D., F. R. S. M. (Lond.), F. A. C. S., F. I. C. S. (Hon.), F. P. C. S. (Hon.), F. J. C. S. (Hon.), F. B. C. S. (Hon.), *Stuart T. Ross,* M. D., F. A. C. S., F. A. P. S., F. I. C. S., and *Porfirio Mayo Recio,* M. D., M. Sc., F. P. C. S., F. I. C. S. 441 pages; 228 illustrations and 5 plates in full color. J. B. Lippincott Co., Philadelphia, Pa., 1956. Price $10.

FUNDAMENTALS OF NURSING, The Humanities and the Sciences in Nursing, by *Elinor V. Fuerst,* R. N., M. A., and *LuVerne Wolff,* R. N., M. A. 592 pages; illustrated. J. B. Lippincott Co., Philadelphia, Pa., 1956. Price $5.

PRINCIPLES AND METHODS OF STERILIZATION, by *John J. Perkins,* M. S. 340 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1956. Price $8.

ULCERS OF THE LEGS, by *Pedro Piulachs,* M. D. 574 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1956. Price $15.50.

EMOTIONAL HAZARDS IN ANIMALS AND MAN, by *Howard S. Liddell,* Ph. D. American Lecture Series, Publication Number 299, A Monograph in American Lectures in Objective Psychiatry, edited by *William Horsley Gantt,* M. D. 97 pages. Charles C Thomas, Publisher, Springfield, Ill., 1956. Price $2.50.

ESSENTIAL UROLOGY, by *Fletcher H. Colby,* M. D. 3d edition. 656 pages; illustrated. Williams & Wilkins Co., Baltimore, Md., 1956. Price $8.

DERMATOLOGY, by *Donald M. Pillsbury,* M. A., D. Sc. (Hon.), M. D.; *Walter B. Shelley,* M. D., Ph. D.; and *Albert M. Kligman,* M. D., Ph. D. 1,330 pages; 1,117 illustrations on 564 figures. W. B. Saunders Co., Philadelphia, Pa., 1956. Price $20.

A GUIDE FOR PSYCHIATRIC AIDES, by *Charlotte R. Rodeman,* R. N., B. S., M. Ed. 234 pages. The Macmillan Co., New York, N. Y., 1956.

PRACTITIONERS' CONFERENCES, Held at the New York Hospital-Cornell Medical Center. Volume 4, edited by *Claude E. Forkner,* M. D. 407 pages; illustrated. Appleton-Century-Crofts, Inc., New York, N. Y., 1956.

ROENTGEN SIGNS IN CLINICAL DIAGNOSIS, by *Isadore Meschan,* M. A., M. D., with the assistance of *R. M. F. Farrer-Meschan,* M. B., B. S. 1,058 pages; 2,216 illustrations on 780 figures. W. B. Saunders Co., Philadelphia, Pa., 1956.

SURGERY FOR GENERAL PRACTICE, by *Victor Richards,* M. D. 947 pages; 476 illustrations. The C. V. Mosby Co., St. Louis, Mo., 1956. Price $17.50.

HUMAN ANATOMY AND PHYSIOLOGY, by *Nellie D. Millard,* R. N., M. A.; *Barry G. King,* Ph. D.; and *Mary Jane Showers,* R. N., M. S. 4th edition. 593 pages; 315 illustrations with 55 in color. W. B. Saunders Co., Philadelphia, Pa., 1956.

J. A. M. A. CLINICAL ABSTRACTS OF DIAGNOSIS AND TREATMENT, 1956, published with the Approval of the Board of Trustees, American Medical Association. 661 pages. Intercontinental Medical Book Corp. with Grune & Stratton, Inc., New York, N. Y., 1956. Price $5.50.

PSYCHOPATHY AND DELINQUENCY, by *William McCord,* Ph. D., and *Joan McCord,* Ed. M. 230 pages. Grune & Stratton, Inc., New York, N. Y., 1956. Price $6.50.

STUDIES IN TOPECTOMY, edited by *Nolan D. C. Lewis,* M. D.; *Carney Landis,* Ph. D., D. Sc.; and *H. E. King,* Ph. D. 248 pages. Grune & Stratton, Inc., New York, N. Y., 1956. Price $6.75.

NEW BASES OF ELECTROCARDIOGRAPHY, by *Demetrio Sodi-Pallares,* M. D., with the collaboration of *Royall M. Calder,* M. D. 727 pages; 520 illustrations. The C. V. Mosby Co., St. Louis, Mo., 1956. Price $18.50.

CLINICAL UROLOGY FOR GENERAL PRACTICE, by *Justin J. Cordonnier,* M. D., F. A. C. S. 252 pages; illustrated. The C. V. Mosby Co., St. Louis, Mo., 1956. Price $6.75.

VENOUS RETURN, by *Gerhard A. Brecher,* M. D., Ph. D. 148 pages; illustrated. Grune & Stratton, Inc., New York, N. Y., 1956. Price $6.75.

THE SPINE, Anatomico-Radiographic Studies, Development and the Cervical Region, by *Lee A. Hadley,* M. D. 156 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1956. Price $6.50.

THE CLINICAL PSYCHOLOGIST, by *William A. Hunt,* Ph. D. 206 pages. Charles C Thomas, Publisher, Springfield, Ill., 1956. Price $5.50.

NATURAL CHILDBIRTH, by *H. B. Atlee,* M. D. American Lecture Series, Publication No. 291, A Monograph in American Lectures in Gynecology and Obstetrics, edited by *E. C. Hamblen,* B. S., M. D. 79 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1956. Price $2.75.

MEDICINAL CHEMISTRY, Volume III, A Series of Reviews prepared under the Auspices of the Division of Medicinal Chemistry of the American Chemical Society, by six authors, edited by *F. F. Blicke* and *R. H. Fox.* 346 pages; illustrated. John Wiley & Sons, Inc., New York, N. Y., 1956. Price $10.50.

SOLUTIONS AND DOSAGE, by *Sara Jamison,* R. N. McGraw-Hill Series in Nursing. *Lucile Petry,* Consulting Editor. 3d edition. The Blakiston Division, McGraw-Hill Book Co., Inc., New York, N. Y., 1956. Price $3.

U. S. GOVERNMENT PRINTING OFFICE: 1956 O—398914